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AIR SERVICES IN NEW ZEALAND

F. H. BISHOP

AIR TRANSPORT is subject to rapid change and development. Any study of it soon becomes out of date. Fortunately the main features of air transport in New Zealand have not changed significantly during the past three or four years. Consequently, this essay based on data for 1950-1951 is still of value. It is not concerned with any of the specialist branches of aeronautics, nor with airline economics; it is simply an attempt to assess from a geographical point of view, the broad characteristics of scheduled internal air services in New Zealand.

During 1950-1951 all scheduled air services in New Zealand were operated by the government-owned New Zealand National Airways Corporation (NAC). These included the rail-air freight service which, at that time, was flown by NAC planes under charter to the New Zealand Government Railways. This rail-air service is designed to provide an air link between the railway systems of the two main islands of the dominion. Figure 1 shows that New Zealand is well covered with air routes. The flight sectors on these routes are comparatively short and even the longest possible flight (from Kaitaia to Invercargill) is only 926 miles. As a direct result of this, the length of the average passenger flight is no more than 240 miles compared with a world average of 500 miles.[1]

It is obvious that there is a correlation between the pattern of the dominion's air routes and the long narrow shape of the country (*Fig.* 1). No NAC aircraft has a pressurised passenger cabin and so no flying is done above 10,000 feet. Hence certain air routes have been slightly redirected so as to avoid close approach to high mountains. At the same time, in spite of New Zealand's reputation for rugged terrain and for changeable 'westerly' cyclonic weather conditions at all seasons of the year, the country's air services have a regularity of flight performance that is very high by world standards. Weather is no serious handicap now that adequate radio navigational facilities are widely established throughout the country.

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[1] Statement of the International Air Transport Association quoted in *N.Z. Herald*, 5 May 1952.

During the year under study NAC had twenty-seven aircraft in actual operation. The main fleet comprised ten 24-passenger Douglas DC3's (Dakotas), five 14-passenger Lockheed C60's (Lodestars), six 6-passenger De Havilland DH87B's (Dominies) and three 3-passenger De Havilland DH83's (Fox Moths). The nine De Havilland aircraft were used on the smaller airfields at Whangarei, Rotorua and Invercargill, and on airfields south of Westport in Westland.[2] In addition to the above-mentioned planes NAC had three Douglas DC3 air freighters (cargo capacity 7800 lbs.); these operated the rail-air service between Wellington and Blenheim. The Douglas airliners were being introduced gradually to replace the Lockheed machines, all of which have since been retired. Thus it could be said that New Zealand was entering, during 1950-1951, its 'DC3 epoch'.

Passenger Traffic All-important

The activities of NAC are essentially concerned with passengers; the rail-air service, on the other hand, carries only freight. During 1950-1951 passenger traffic produced over three-quarters of the corporation's revenue. Charter work, air mail, air freight, excess baggage and sundries provided the remaining income. The charter work was almost entirely concerned with handling rail-air freight; this has since been lost to a private company, so that now passenger traffic produces approximately eighty-five percent of NAC revenue.

By world standards the NAC air transport industry is still comparatively small. During 1950-1951 NAC carried a total of 238,000 paying passengers. This was a notable increase over the previous year's total of 204,000 but it was still only a small part of the world total of air passengers which for the year amounted to thirty-nine million. This figure of 238,000 also shows that air transport's share of New Zealand's internal medium and long distance traffic is still comparatively small. The great bulk of long-distance passenger traffic in this country is still carried by surface transport,[3] except in several restricted localities which are discussed below.

Aircraft, however, carry only a small part of the dominion's freight and mail traffic. Airmail for the year 1950-1951 was only 900,000 lbs.[4]

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[2] Since this survey was made Hokitika airport has been extensively improved so that now the Douglas airliners fly as far south as Hokitika. Greymouth airport has been closed and the town is now served from Hokitika.

[3] Thus during the year 1950-1951 the railways alone carried five million passengers on medium and long distance journeys.

[4] NAC is the only air system which carries mails within New Zealand.

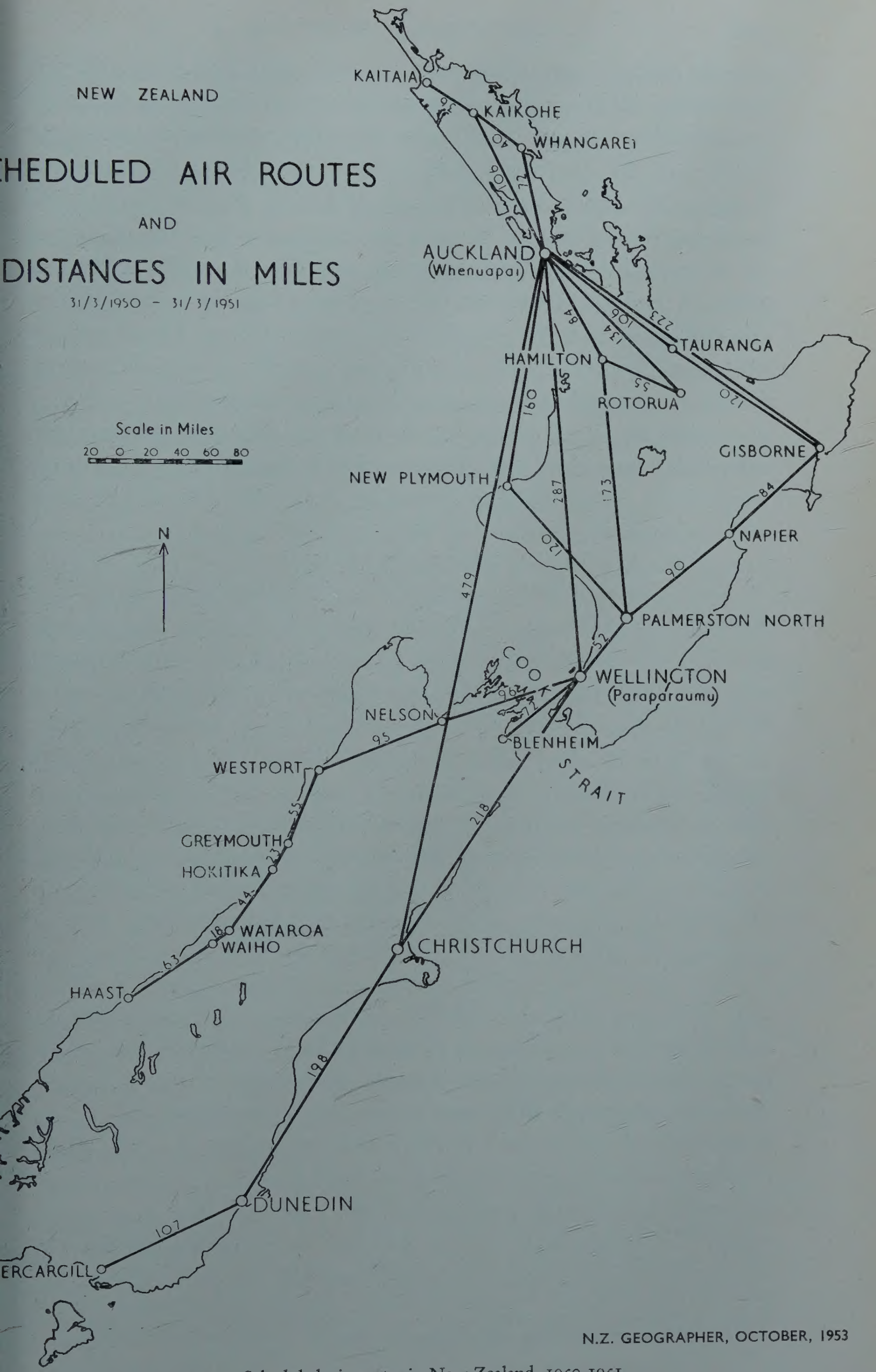

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Fig. 1. Scheduled air routes in New Zealand, 1950–1951.

Freight on NAC services amounted to only 2240 tons compared with over nine million tons carried by the railways. Even the rail-air freight total for the year was only 14,400 tons. Nevertheless, certain special features of this air freight traffic are worthy of note. Air transport handles only certain types of freight. It has no share in carrying the great volume of pastoral farming produce on which the prosperity of New Zealand so largely depends, nor does it handle such other primary products as coal and timber. This is true for both NAC and the rail-air service. Air freight cargoes are made up almost entirely of 'general merchandise'— manufactured goods of a wide variety. Furniture removals are common in rail-air consignments and they also figure to a small extent in NAC cargoes. The only consignments which may be said to partake in any way in the character of primary produce are certain valuable but rather perishable commodities such as day-old chicks, flowers sent from Auckland to Dunedin in season, oysters, crayfish tails and whitebait from certain South Island sources, cherries from Central Otago, and valuable stud livestock. As for rail-air, much of the freight carried by this speedy railways department service is sent because it is as cheap as, and even cheaper than, rail-ship-rail. This applies particularly to the transport of commodities which are light in proportion to their bulk or which, as experience has shown, are liable to an unprofitable proportion of breakages when sent by rail-ship-rail transport.[5] NAC freight consignments, on the other hand, tend to be restricted to those which can bear the higher cost of air freight on account of their inherent value, their urgency, their fragile character, or because they are perishable. This is the case for consignments on the main trunk route; on minor routes certain other features enter into the matter.

TRAFFIC FLOW

Detailed study of the actual flow of traffic, northbound and southbound, over the various routes brings to light several points of importance. For passengers there is a remarkable close uniformity in the totals for each of the two directions on all routes; the only slight exception to this is on the Wellington-Blenheim service where passenger traffic northbound is consistently ten percent higher than southbound. For freight and mail, by contrast, the proportionate flow in the two directions is much different, especially on the minor routes.

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[5] Rail-air is able to charge low freight rates because of 'hidden subsidies' such as the use of ordinary railway facilities for consigning and handling the freight.

On the main trunk route southbound traffic predominates for freight and even more for mail. On minor routes in both islands the flow of freight and mail takes a different pattern; the totals are far greater on services outbound from the main cities than on return services. However, the situation is more complicated than this simple statement of totals would seem to indicate. On most of these minor services there would be very little air freight at all were it not the practice of the corporation to arrange contracts at special concession rates for 'filler freight'. Such regular contracts provide much freight from the main cities to minor centres, but the goods handled are all manufactured goods such as whisky to Gisborne and butchers' small goods to Kaitaia. Owing to the insignificance of these minor centres as importing ports or manufacturing centres very little success has so far been achieved in arranging contract return consignments of filler freight.

Air-transport Regions

Even the most casual study of Figures 4, 6 and 7 reveals clearly the dominant importance of two sections of the air services' network in New Zealand. These are, first, the 'main trunk' linking the four main cities of Auckland, Wellington, Christchurch and Dunedin, and, second, the Cook Strait crossing between Wellington in the North Island and Nelson, Blenheim and Christchurch in the South Island. A description of New Zealand's air services is much facilitated if these and other distinctive sections of the network are selected and treated as individual air-transport regions. Figure 2 sets out the regional subdivision of the dominion that has been adopted for the present description. It will be noticed that the main trunk and Cook Strait regions both include the Wellington-Christchurch flight sector. This overlap has been adopted because it simplifies the present task and because any alternative method would certainly break down in actual use. The criteria for the delimitation of these various air-transport regions will appear as this description proceeds. They are chiefly location, the tendency to form self-contained air-traffic units, the volume of traffic, and local special features.

Main Trunk

The main trunk route links directly New Zealand's four main cities. This gives it an immediate 'hinterland' of forty-one percent of the dominion's population, seventy-eight percent of its manufacturing output and ninety-six percent of its imports. The promise of traffic potential is fully borne out by the actual air-traffic totals, for these four cities together provide the bulk of the traffic of all types carried on New Zealand's scheduled air services. Half, or more, of the NAC traffic at each of these four airports is channelled into the main trunk service. But besides this, an examination of the actual traffic carried by the planes on this service reveals that the main trunk region has a marked tendency to be self-contained. Over eighty-five percent of the passengers on each of its three route sectors originate from one or other of these four main cities, and the great majority of these passengers also end their journeys at a main trunk city.

During 1950-1951 these three main trunk flight sectors together made up only one quarter of NAC's air-route mileage, but with their frequent services they accounted for sixty-seven percent of the corporation's passenger air-miles, eighty-two percent of its mail ton-miles, and seventy-six percent of its freight ton-miles.[6] The corporation used its largest planes on this route which also had the greatest frequency of services of any air-transport region in the country. The main trunk was also the only region where all the airports were fully equipped for radio range (medium frequency) air navigation. Directly dependent on this radio range installation were NAC'S only night services. These were flown between Christchurch and Auckland, but the last flight finished no later than 10.00 p.m.[7] During 1950-1951 this section of the NAC network had the highest flight performance in terms of regularity of any region in New Zealand, an average of only one flight in every 200 being cancelled. Average loading percentages for both passengers and freight-mail were among the highest in the country. For freight and mail there was more traffic southbound than northbound but the proportional disparities between the totals in each direction were small compared with those existing on other air routes in the dominion. It is little wonder, then, that this is the corporation's most profitable service. It is NAC policy to use such profits 'to meet deficits on less payable routes'.

COOK STRAIT LINK

In many parts of the world notable water-gaps between populous areas have frequently proved to be some of the most promising sites for

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[6] During the first nine months of the year 1950-1951 rail-air also contributed a little to this main trunk traffic for it ran one return flight for freight each week between Wellington and Christchurch. This has been discontinued.

[7] No services are flown at a later hour on account of the difficulties of arranging late ground transportation and hotel bookings for passengers.

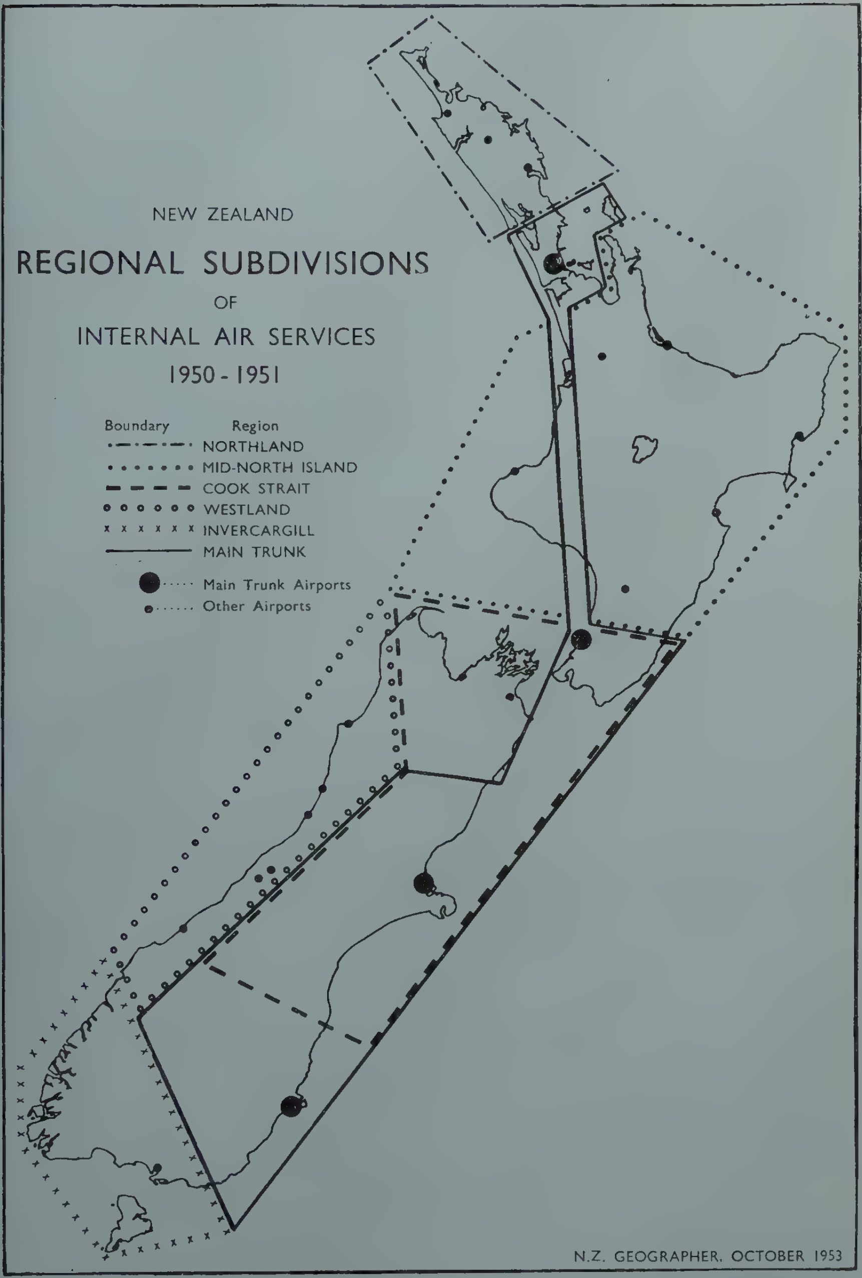

Fig. 2. The air-transport regions of New Zealand.

air services, and Cook Strait, fourteen miles wide, is no exception. But while the Cook Strait air-transport region has, as its name indicates, location as an outstanding characteristic, it is also highly distinctive on account of the nature of its air services and the quantity of its air traffic. During the year under study its air services were a combination of the activities of NAC, the rail-air freight service, and the regular air-taxi work carried on extensively by the local aero clubs in competition with the corporation. In fact, this was the only region in New Zealand where any regular air transport was carried on except by the corporation.

Nelson and Blenheim are characterised by a certain degree of isolation. The largest city in the South Island is Christchurch, but it is rather remote from Blenheim and Nelson which tend to look across Cook Strait to Wellington as a bigger attraction. Air services have benefited from this fact even though, during 1950-1951, Wellington's airport was at Paraparaumu which is thirty-three miles from the centre of the city. So ready have local residents and visitors been to make use of air transport that Blenheim and Nelson hold a very high rank for airmindedness among the towns of New Zealand (*Fig.* 3). The retarding influence of the water-gap on surface transport is also seen in the fact that both Wellington and Christchurch are much more airminded than either Auckland or Dunedin.

As a whole, the Cook Strait air-transport region has somewhat less tendency to be self-contained than most of the other regions here discussed. Nevertheless, this characteristic is strongly developed in the case of Blenheim and Nelson, eighty and seventy percent of whose air passenger traffic respectively is limited to flights to or from Wellington. By contrast, little more than half Wellington's passenger traffic is with the other three towns in this region, while in the case of Christchurch the proportion falls to only one third, almost all of this being with Wellington.

IMPORTANCE OF COOK STRAIT

Traffic figures show the outstanding importance of the Cook Strait region. During the year under study 128,000 of the corporation's air passengers made the Cook Strait crossing—fifty-three percent of the total number of the corporation's passengers for the year. This region's share of the NAC total weight of freight and mail carried was even higher—seventy-three percent of the air freight and fifty-six percent of the airmail. Figure 7 shows very clearly the importance of the Cook Strait crossing in the NAC freight traffic, but if this map had been drawn to include the rail-air freight totals along with the NAC freight,

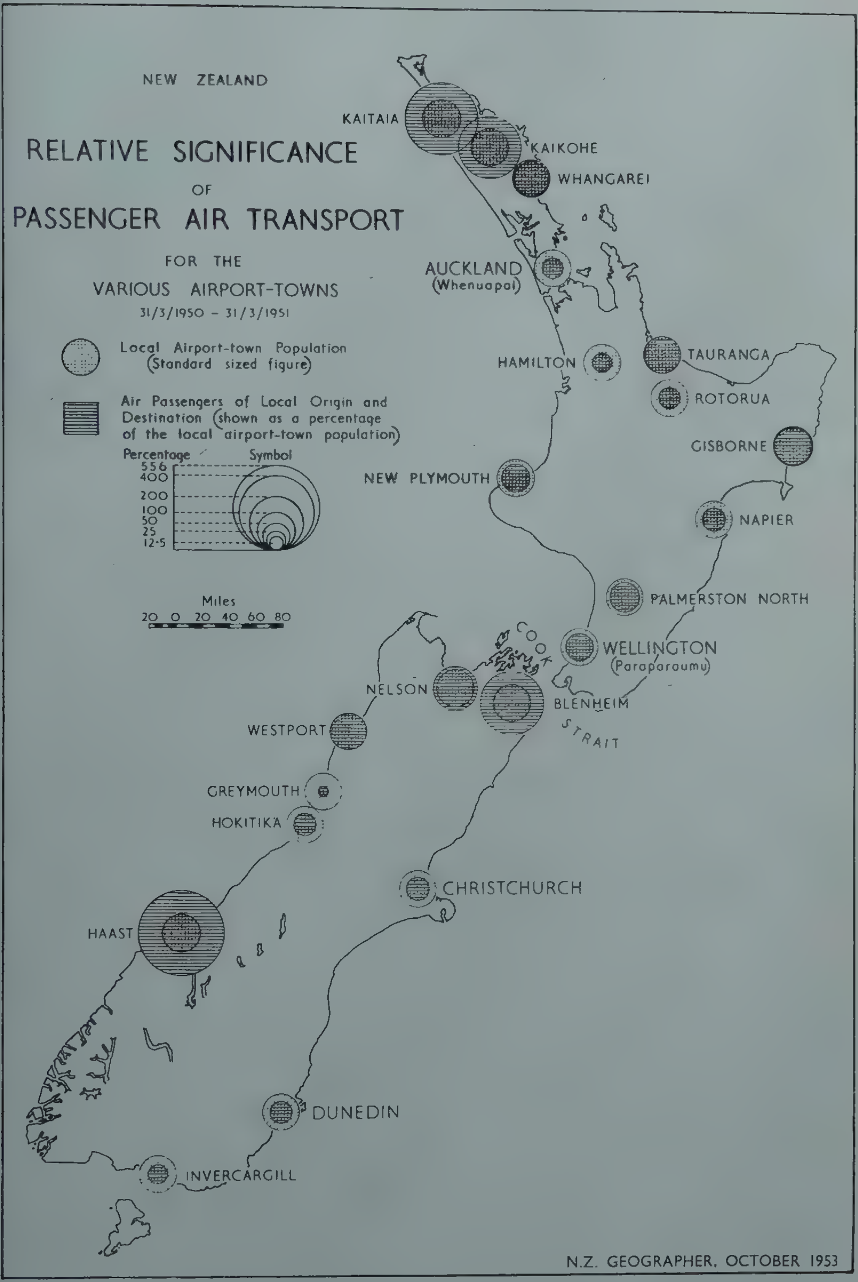

Fig. 3. Significance of passenger air transport at various airports, 1950–1951.

the flow-bars south from Wellington would be ten times the existing width, and ninety-eight percent of the increased width would be on the Wellington-Blenheim flight sector. Since its inauguration in 1947, this rail-air freight service has been very profitable for the railways department. The profit has come both from direct rail-air charges as well as from the increased revenue brought to the Picton-Christchurch railway.

During 1950-1951 the Wellington-Blenheim flight sector was the only place in New Zealand where local aero clubs entered into notable competition with the corporation's services. Small three-passenger planes belonging to the Wellington and Marlborough aero clubs used Rongotai airport which is only four miles from central Wellington. Between them these two aero clubs transported approximately 2000 passengers across the strait in the eight months following August 1950 when this regular air-taxi service was introduced.

TABLE I

AIR PASSENGER TRAFFIC ACROSS COOK STRAIT*

Route	*Year ending 31 March*					
	1947	*1948*	*1949*	*1950*	*1951*	*1952*
Wellington-Christchurch	5	11	12	13	15	25
Wellington-Blenheim	25	27	24**	26	28	34***
Wellington-Nelson	18	24	26	32	36	53

*Expressed as percentages of the total number of persons crossing by air.

**This temporary decline was associated with the necessary transfer of airline operations from Rongotai airport in Wellington to Paraparaumu.

***The large increase during the year 1951-1952 was partly due to the waterfront strike which occurred during the first half of 1952.

A development of some importance arising out of the corporation's Cook Strait air services has been the impact of this form of transport on shipping. Table I shows the steadily increasing percentages of passengers who, in recent years, have elected to cross Cook Strait by air instead of by ship.

During the year 1950-1951 of all the travellers who crossed Cook Strait some twenty-one percent went by air; this proportion increased to thirty-two per cent in the year 1951-1952. In view of the abandonment during this year, 1953, of the Wellington-Nelson passenger service by the shipping company concerned, the above figures make interesting reading. In South Westland air transport replaced regular land transport in 1934-1935, but this Wellington-Nelson link is the first major transport route in New Zealand to have its regular short-frequency services taken over by air transport.

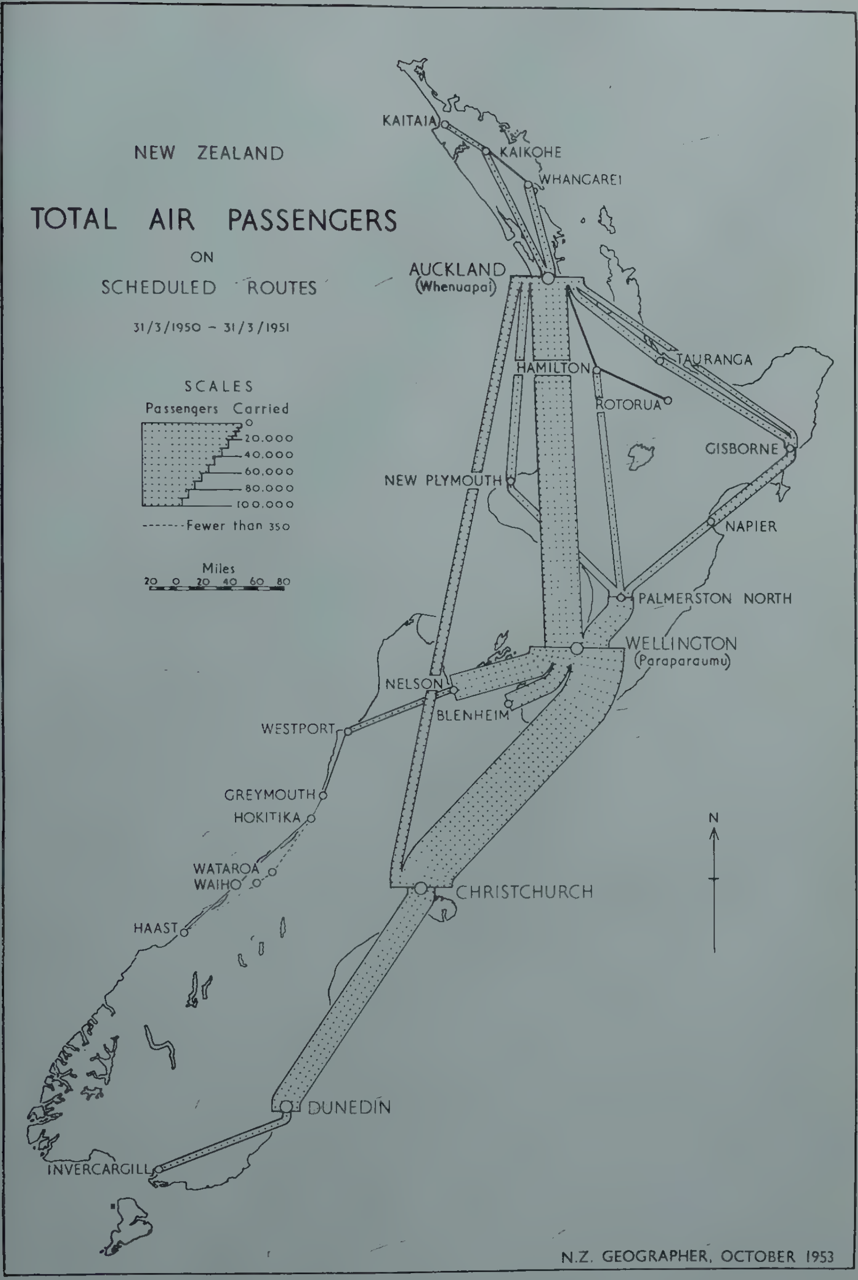

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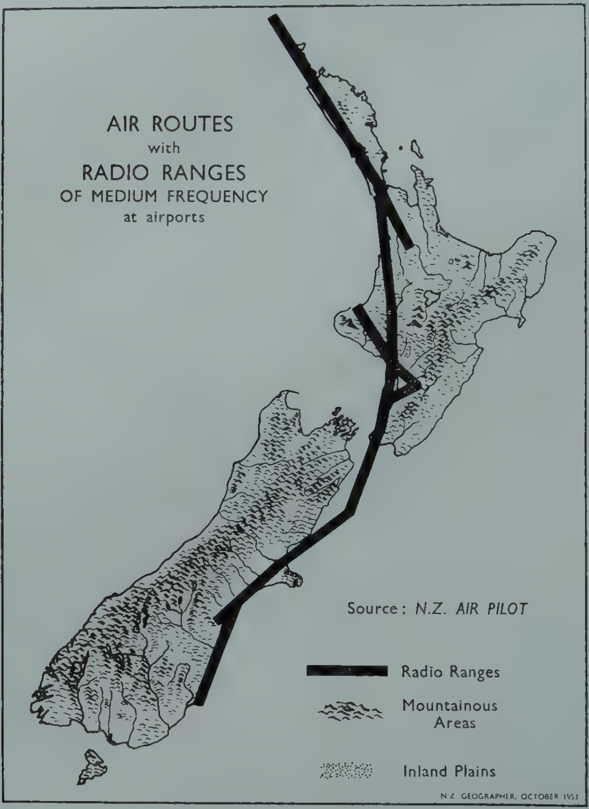
Fig. 4. Number of passengers carried on scheduled routes, 1950-1951.

The Northland air transport region is very largely self-contained. At each of its three airports, Whangarei, Kaikohe and Kaitaia, three-quarters of the passenger traffic is limited to flights to or from Auckland, while much of the remaining passenger traffic is between the three airports within the region itself. Considering this restricted range of flights it is interesting to find that, in proportion to their populations, Kaitaia and Kaikohe figure as the most airminded localities in New Zealand after Haast in South Westland (*Fig.* 3). As elsewhere in the dominion, airmindedness tends to increase directly in proportion to isolation, but isolation in Northland is one rather of length of time taken for surface journeys than of the actual distances.[8] No doubt the range of types of alternative methods of transport available also needs consideration; on land, Whangarei and Kaikohe have both road and railway connections with Auckland while Kaitaia has road connections only.



Source: N.Z. *AIR PILOT*

Fig. 5. Air routes controlled by medium-frequency radio ranges.

Throughout 1950-1951, passenger loadings on the planes serving Northland were consistently good, but the same cannot be said for freight and mail; in fact, one outstanding characteristic of air transport in this northern part of the country is that freight and mail traffic are almost negligible. During the year under study Northland produced four and one half percent of the NAC passenger air-miles but less than one percent of the ton-miles for each of freight and mail. Planes flying on the Kaikohe-Kaitaia service have the assistance of a radio range for air navigation (*Fig.* 5) and, as a result, flight performance regularity figures are very high. Whangarei airport, on the other hand, is small and can be served by only the very unprofitable six-passenger Dominies. These planes are able to operate in visual-flying conditions only and so flight cancellations at Whangarei are abnormally high.

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[8] Note also that plane fares to Kaitaia are lower than bus fares.

Mid-North Island Region

The remainder of the North Island airports can be conveniently taken together as forming what may be called the mid-North Island region because the area has a certain broad unity in its air-transport characteristics. The air routes here form a pattern flanking the main trunk and linking up a series of large boroughs and small cities. This air-transport region has a marked tendency to be self-contained although this characteristic is not so strongly developed as in Northland. By far the greater part of the air passenger traffic of the towns of this mid-North Island region is with Auckland or Wellington or with other airport towns within the region itself. Thus it is obvious that the air routes of this region are not essentially, nor even largely, feeders to the main trunk service.

This region has over forty percent of the corporation's air route mileage but the services on its various flight sectors are generally limited to only one return flight each day. During 1950-1951 this region produced nineteen percent of the NAC passenger miles, thirteen percent of its freight ton-miles and only nine percent of its mail ton-miles. The various traffic-flow maps (*Figs.* 4, 6, 7) reveal that, with only two exceptions, the various air route sectors of the mid-North Island region have a noticeable uniformity in their totals of passengers, freight and mail carried. However, for freight and mail, the totals transported outwards from Auckland and Wellington are much larger than the average return cargoes.

In its southern portion the Westland air-transport region is the most isolated in New Zealand but the other airport towns of the region

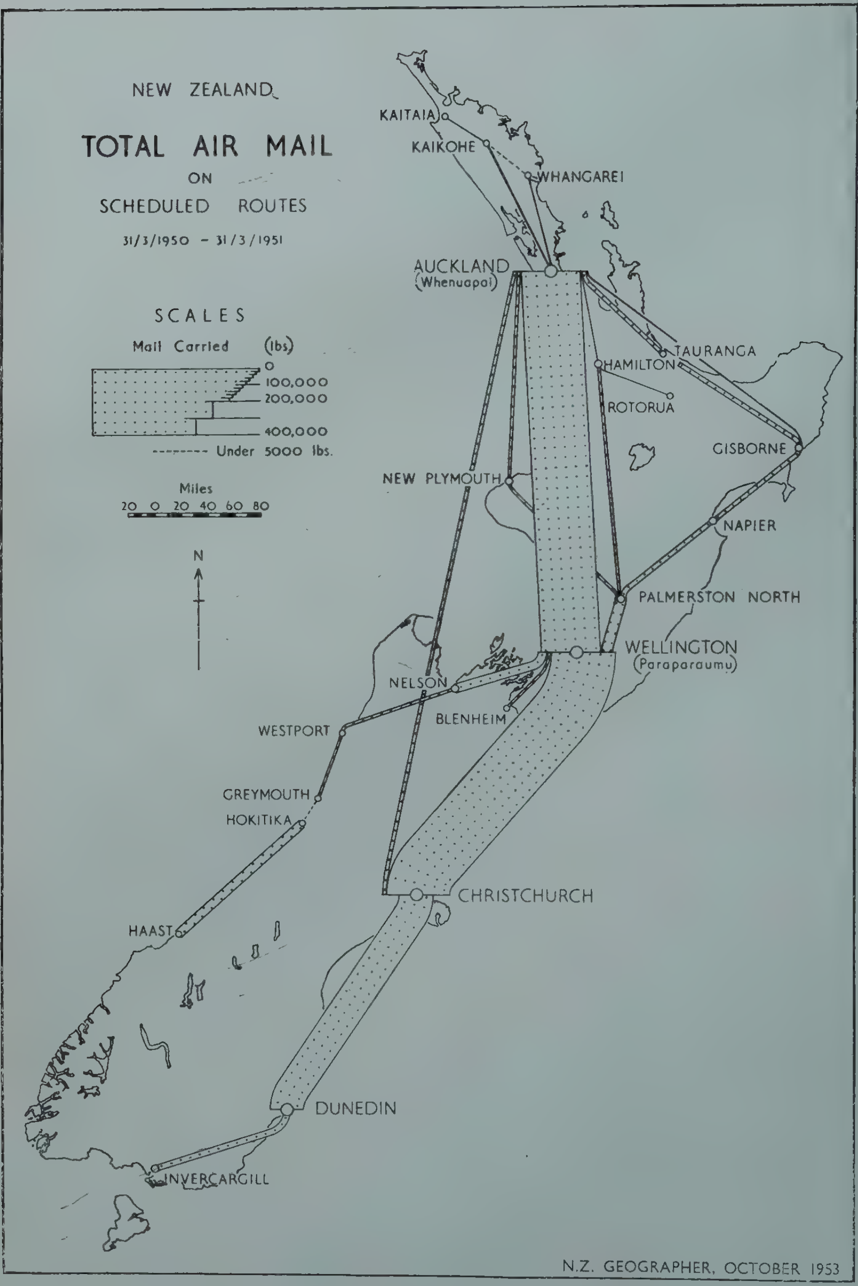

Fig. 6. Weight of airmail carried on scheduled routes, 1950–1951.

are rather isolated also. Haast and Westport make liberal use of their air-transport facilities but, during 1950–1951, Greymouth was by far the least airminded town in the dominion. Greymouth and, to some

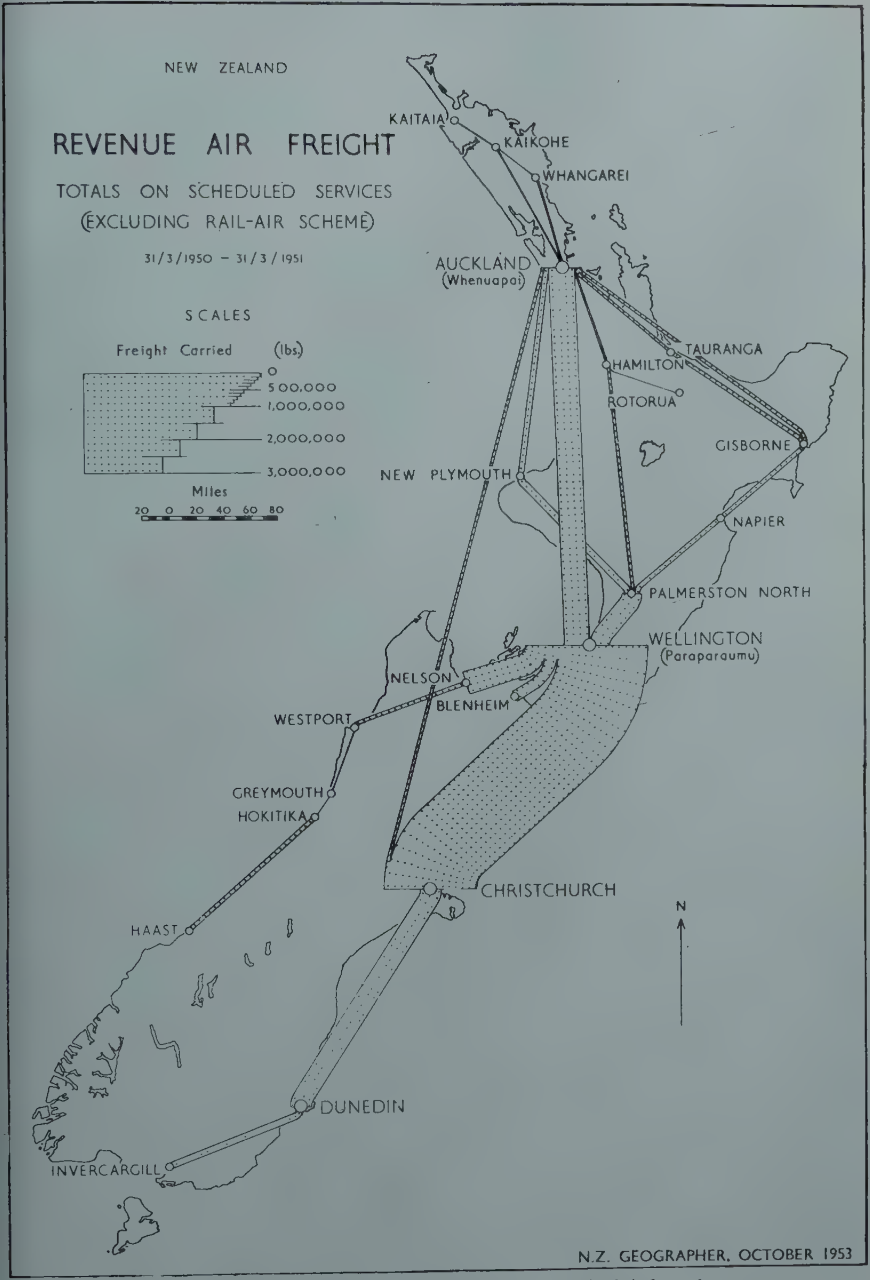

Fig. 7. Weight of revenue-producing air freight carried on scheduled services, 1950–1951.

extent, Hokitika make less use of air transport because they look strongly to Christchurch as their main centre and their air services do not go the way the people want to travel since there is no direct air link between Westland and Christchurch.

Westland has the lowest totals for passenger traffic of any air-transport region in New Zealand, but its totals for freight and mail are somewhat higher. Air traffic here is so light that the region not only has the lowest frequency of air services in New Zealand but also, on its southern portion, uses NAC's smallest planes (the three-passenger Fox Moths). North of Hokitika there is one return flight per day, but south of Hokitika there are only three flights each way per week. Indeed, it is convenient to divide Westland into two subregions with Hokitika as the dividing point. The subregion north of Hokitika has most of the air transport features found in other parts of New Zealand except that a self-contained character is lacking, for most of the air passenger traffic is with airports lying outside the region, especially Wellington.

HAAST SUBREGION

In the southern portion of Westland, Haast accounts for most of the passenger traffic and for all the freight and mail handled. Air transport here assumes characteristics not found anywhere else in New Zealand. Haast is a district without a township. It is particularly isolated for it lies thirty miles by a rough bush track beyond the southern terminus of the Westland highway. Its only surface transport is a periodic visit by a small coastal ship. Air transport is the very life of the area, and the number of its air passengers makes it the most airminded locality in New Zealand. This subregion has a strong self-contained character since most of its air traffic of all types is limited to flights to or from Hokitika. Perhaps the most interesting local feature is that by special arrangement all mail to and from Haast is carried by air without any airmail surcharge, and this includes parcels up to twenty-eight pounds in weight. Besides this, air freight to and from Haast is of great local importance (*Fig.* 7), and includes an astonishing variety of goods. During 1950-1951 the service could average little better than one passenger per flight, but this typical single passenger would have found that on a southbound flight the 'empty' seats were loaded up with such things as mailbags, bread, meat, groceries, fruit, hardware, liquor, ammunition, and such repaired articles as radios, bicycles and machinery parts. Outward freights from Haast are of a very different nature and fluctuate considerably in amount week by week as well as seasonally. Equipment needing repairs is carried at all times of the year as well as such year-round products as deerskins. Whitebait is a very important article of freight in spring and early summer, and crayfish tails are also carried in season. These products are transported by air as far as Hokitika whence they normally continue their journey to Christchurch by railway.

INVERCARGILL REGION

The Invercargill region is composed of only one flight sector. Like Whangarei and Rotorua it is at a strong disadvantage in that its aerodrome may be used by only small Dominie aircraft. A shuttle service of three return trips daily is flown between Dunedin and Invercargill but the average daily total number of passengers during 1950–1951 would have only little more than half-filled a Dakota on one return flight. This region is not notably self-contained in its air traffic, for over half its passenger traffic is with places north of Dunedin, chiefly with Christchurch, Wellington and Auckland. This shows that from the traffic point of view the region might well be considered as an extension of the main trunk service. However, at present it must be regarded as no more than a feeder to the main trunk because the Dakotas on the latter service terminate their southbound flights at Dunedin and passengers to Invercargill have to change to the small Dominie. Further, this small Dominie cannot stay overnight at Invercargill; it operates out of Dunedin. Thus there is no through service such as should characterise a main trunk service.

During 1950–1951 Invercargill had 8000 air passengers. This was fewer than Whangarei, a town only one third the size of Invercargill. Thus this southern city has, at present, a comparatively low figure for airmindedness. Certain improvements to the aerodrome at Invercargill would enable Dakotas to fly this far south, but the city would become part of the main trunk only if it were given proper terminal hangar facilities and the plane stayed there overnight. Past experience in other parts of New Zealand has shown that wherever Dominie aircraft have been replaced by larger planes a considerable increase in air traffic has always followed. There is ample evidence to show that if the larger planes could be used at Invercargill the number of air passengers carried would be at least doubled immediately.

It is obvious from this present brief analysis that air transport varies considerably in significance and importance from one part of New Zealand to another. For the country as a whole it provides a faster, more convenient, and reasonably cheap service with a dominion-wide route pattern that now links almost every town of importance in New Zealand. Already the popularity of air transport is great enough to put this country second to Australia among the leading countries of the world for airmindedness in proportion to population totals. Locally within New Zealand, especially in the far north of Northland, across Cook Strait, and in South Westland, air transport has become sufficiently important to be regarded as a serious competitor with the longer established modes of transport. On the other hand, on account of the large volume of traffic carried, the main trunk must be regarded as by far the most important air service in the country.

Air transport has come to contribute significantly to the geographic character of New Zealand. By its effects within the country it is one feature, sometimes a very important feature, which serves to differentiate one part of the dominion from another. For the country as a whole, it contributes to make New Zealand even more sharply differentiated geographically from those countries of the world which have not developed aviation to the same extent.

SUGAR CANE IN QUEENSLAND*

A. D. TWEEDIE

THE SUGAR-CANE industry of Queensland has received wide publicity as an example of the possibilities of white settlement in the tropics.[1] The exclusive use of white labour in the cultivation and harvesting of a crop which, in terms of tonnage harvested, is larger than any other in the commonwealth, has placed Queensland sugar production in a unique position in the Australian economic, social and political system.[2]

Economically, sugar ranks second only to wool in value in Queensland agriculture, whilst its importance to the sterling area as a whole is reflected in the increased and guaranteed overseas market afforded by the current British Commonwealth Sugar Agreement. The industry is at present undergoing marked but controlled expansion to meet these overseas demands and those also of a home market increased by a vigorous postwar immigration policy. Socially and politically, the sugar industry is regarded as 'the only one offering prospects of increasing the population of Northern Queensland . . . [and] any contraction of [it] must result in lowered population.'[3] It is estimated that 200,000 people, or one seventh of the total population of the state, are directly or indirectly dependent upon sugar-cane production.

CANE AND CONTROLS

This ability to attract an increased population is in no small measure the result of the stability which has characterised the industry since 1925. Stability has been ensured by rigid government control of production, in particular through the assignment system. The decision to operate the industry by white labour inevitably meant some measure of official encouragement and control. It was not until 1925, however, that the assignment system regulated the area under cane. Assignment not only controlled output (at least within the limits set by climatic fluctuation) but it also eliminated the possibility of a repetition of the reckless overexpansion of the early 'twenties. Since 1925 the expansion of the industry has thus been dependent upon the decision of a Central Cane Prices Board.

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[1] See especially A. Grenfell Price: *White Settlers in the Tropics*, American Geographical Society, Special Publication No. 23, 1939.

[2] A limited amount of sugar cane (less than five percent of the commonwealth total) is produced in the Northern Rivers district of New South Wales.

[3] *Report on the Australian Sugar Industry*, Canberra, 1952.

The repatriation of kanaka labour in the first decade of the present century resulted in changes other than the extension of political control. It heralded the decline and virtual decay of the plantation system. Today only twenty-four holdings, totalling less than four percent of the total assigned area, exceed 250 acres in extent. Essentially it is an industry based on small owner-operated holdings. The area officially considered as 'suitable for a reasonable living', which governs the granting of new assignments, varies from north to south, but nowhere does it exceed fifty acres. Nor is processing exclusively under company control. Of the thirty-two crushing mills operating in Queensland, only seventeen are proprietary companies, and in terms of crushing capacity more than forty-seven percent of the state crop is processed in cooperative mills.[4] Today only four proprietary mills have associated plantations varying in size from the 8,000 acres of the Fairymead mill to the 400 acres of the Qunaba mill, both of which are located in the Bundaberg region. The Fairymead mill, drawing seventy-five percent of its cane from estates owned and operated by the company, remains as the only true example of tropical plantation agriculture.

CONTROLS AND CULTIVATION

Restriction of cane land has led to scientific attempts to increase yields. This is reflected in the generally upward trends in sugar production per acre in all areas (*Fig.* 4). It has resulted in the widespread use of insecticides, potash fertilisers and mill by-products—in particular, the use of molasses which has a beneficial effect on soil structure. It is reflected in the interest of growers in production techniques and new varieties developed by experimental stations, and in the use of machinery in all phases of production save one. Despite several attempts to introduce machine harvesters, the crop is, with limited exceptions, harvested by hand. The inability of mechanical harvesters to guarantee clean cane for processing, the small size of holdings and, in particular, the lack of suitable loading devices to keep pace with such harvesters, have restricted their use to two plantations. Dependence on manual harvesting and the consequent seasonal competition for available labour has led to growers sponsoring some practices which are not in the industry's best interests. The controlled burning of cane before harvesting, with the consequent risk of reduced sugar content in 'stale' cane, was initiated primarily to speed up the hand-cutting process by the removal of trash. The practice is now demanded as a means of combating Weils disease in rat-infested cane and requires the cutters to work in the hotter conditions in the lee of the crop.

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[4] *Australian Sugar Yearbook,* Brisbane, 1953.

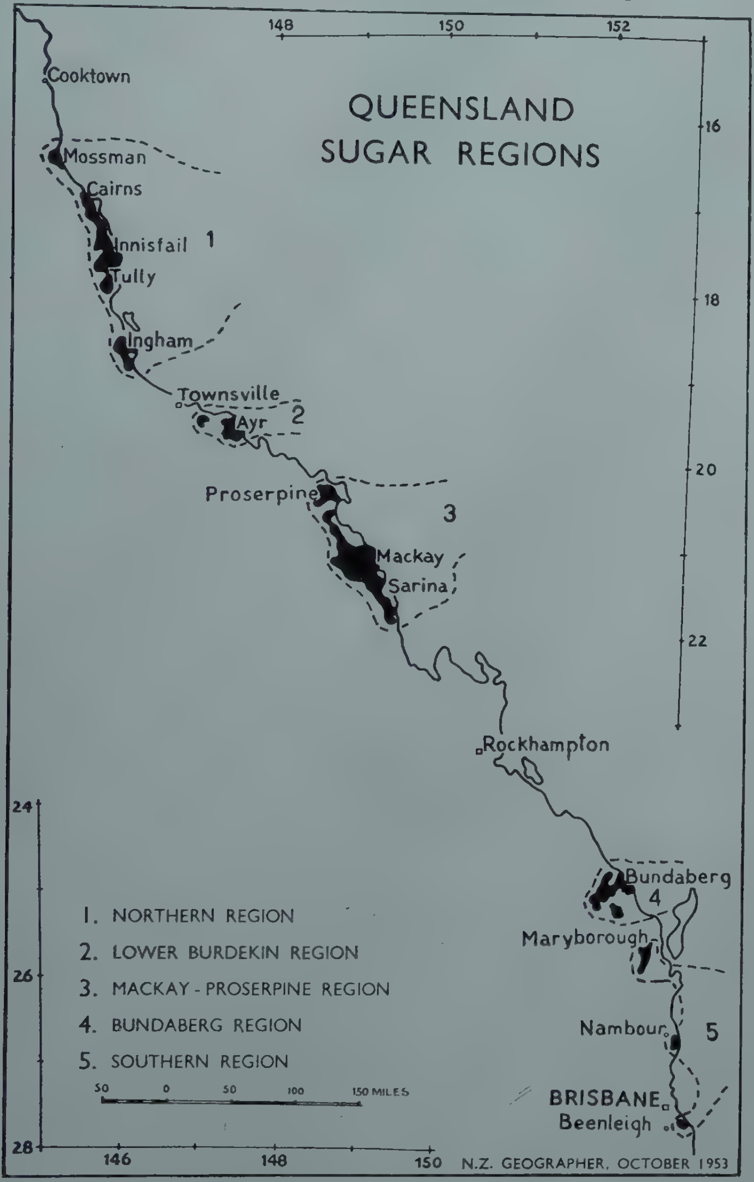

Fig. 1. The sugar-producing regions of Queensland.

This use of hand labour for harvesting, however, has a significant social effect. It contributes more than any other phase of the industry to the increased population and the attraction of the sugar areas.[5] Although it is admitted that costs of establishment in new areas are high, and that the assignment system has raised the sale price of cane lands, sugar-cane production remains one of the few primary industries in the commonwealth attractive to the settler with limited capital. The possibilities of cooperative effort in establishing and working cane farms has been fully exploited by southern European immigrants, employed first as cutters, and today holding some twenty-five percent of the sugar assignments of Queensland.

Distribution and Regional Variety

Cane production in Queensland is essentially a coastal occupation. Climate, soils and transport largely restrict the activity to within fifty miles of the coastline and even here it is dispersed in a series of favoured regions. The sugar lands reach through ten degrees of latitude strung out like beads from Mossman to Beenleigh (*Fig.* 1).

As might be expected, government control has produced broadly similar features even in such widely dispersed areas. The intensive cultivation of small owner-operated holdings, the four-year rotation system of plant cane, two ratoon crops and a legume manure crop (established by the restriction of the cane harvest to three-quarters of the gross assigned area), the manufacture of raw sugar for export to the state capitals and overseas, and the high densities of rural population—these are typical features of the areas surrounding prosperous sugar towns such as Innisfail and Bundaberg. They serve to differentiate the industry from other agricultural activities in Queensland. But differences in the physical environment, agricultural and associated land-use practices combine with volume of production and future potential to create five well-defined sugar-producing regions.

Northern Region

Historically the youngest of the sugar-producing regions, the discontinuous flats and bottom lands of the alluvium-filled trench stretching from Cairns to Tully, with floodplain outliers at Mossman and Ingham, today form the most important area in terms of overall production (*Fig.* 3). Here, too, is the only established area in Queens-and where sugar cane will set seed, and in consequence it is the scene

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[5] It is estimated that a total of more than 6,500 cutters were required to handle the 1953 crop.

Fig. 2. In the Northern Region the isolated sugar-cane lands are dominated by steep slopes clothed in dense rainforest.

of the plant breeding upon which so much of the present prosperity and future expansion of the industry depends.

Although cane has been grown in parts of the area since the late 1870's the dominance of the area dates only from the boom following the 1914–1918 war and the establishment of cooperative mills, with attached assigned areas at Babinda (forty miles south of Cairns), at Tully and at Mulgrave. The heart of the region is contained in the structural depression, flooded with alluvium and deposits from post-Tertiary volcanic flows, which extends south from Cairns for seventy-five miles. With an altitude never in excess of fifty feet, the trench varies in width from fifteen miles to a few hundred yards. In the main, maritime influences, and in particular the cooling effect of sea breezes, are reduced by the coastal range which separates the trench from the sea. As far south as Tully the area is backed by the steep scarps of the plateau to the west. On the valley floor, the flatness of the floodplain contrasts with the rolling slopes of the dissected basalt flows west of Innisfail; but throughout relief is generally well suited to mechanical cultivation. In some areas, as for example at Greenhill in the coastal range twelve miles south of Cairns, cane growing has spread on to slopes of up to thirty percent; but the cultivation of excessive slopes is not a distinctive feature, and with the possibility of the draining of lower lands, it is not likely to extend.

Rainfall is markedly seasonal and intensely variable from year to year. Yet it is in general adequate and there is no need for irrigation. Annual average totals are everywhere in excess of sixty inches and at Babinda reach the maximum, for the state, of 162 inches. Such figures, however, give no indication of the character, nor in particular, of the intensity of summer precipitation. Heavy falls produce a high run-off and serious erosion hazards and, combined with the high temperatures, seriously reduce the effectiveness of summer precipitation.

Soils vary within the area, but a good structure and high humus content are common throughout. Farmlands have been cleared from dense vine scrub which still covers the steeper slopes of the area. Physical conditions generally are well suited to the rapid growth of heavy canes, in particular of the Trojan variety, which, bred at Ingham, is now dominant throughout the region.

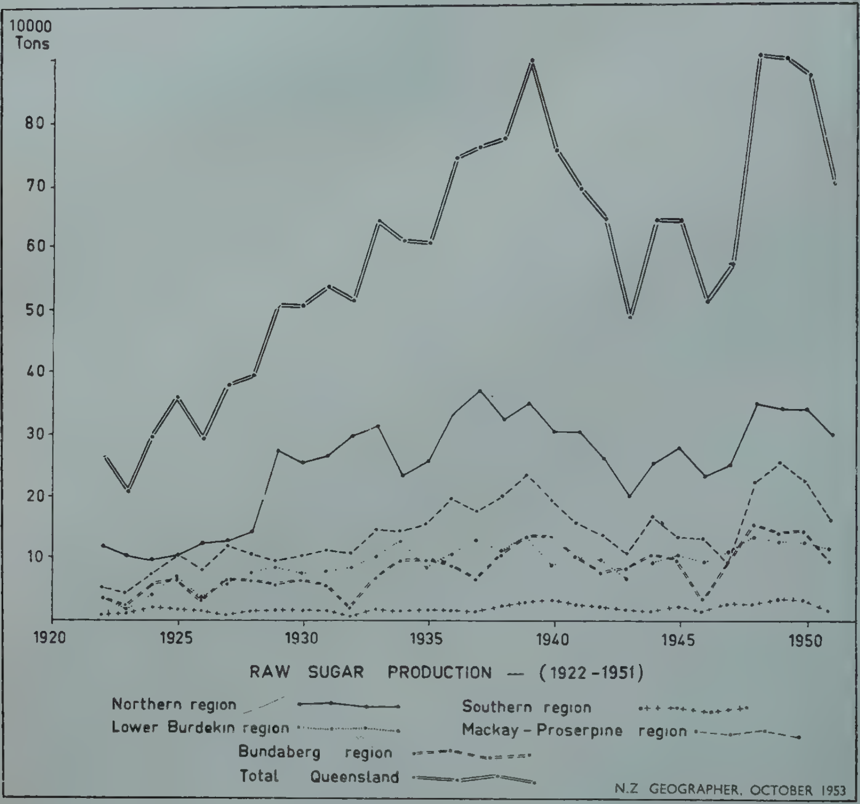
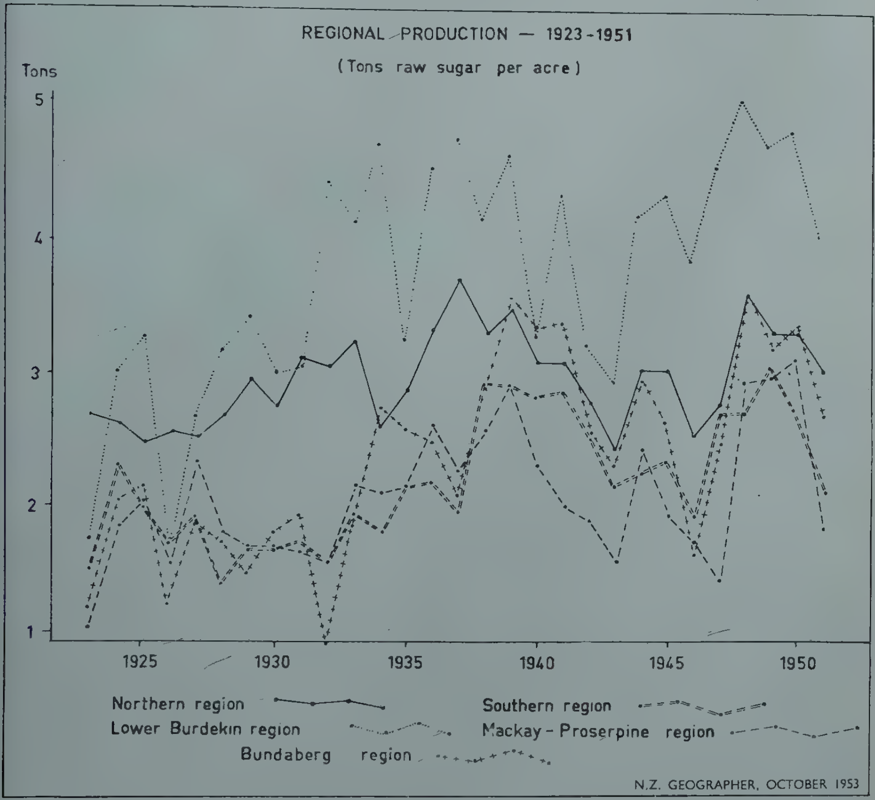


Fig. 3. Raw-sugar production in Queensland, 1922-1951.

In all, ten mills service the 2500 cane farms in the area. Half of these are proprietary mills, but there is today no other relic of the earlier and generally unsuccessful plantation system. Only four percent of the assigned area is held in holdings exceeding 250 acres and the controls have since 1925 ensured that average holdings are closer to the size considered 'suitable for an economic living' than is the case elsewhere. Sixty percent of all holdings are between forty and a hundred acres (*Fig.* 5). Production per acre varies with seasonal conditions, but since 1923 the Northern Region has rated second only to the controlled production of the Lower Burdekin in all but the later war years (*Fig.* 4).[6] In contrast to holdings, mills are large. All ten mills within the region have crushing capacities in excess of 200,000 tons of cane with a possible production under present assignments of 450,000 tons of raw sugar, or more than forty percent of the potential Queensland total.



REGIONAL PRODUCTION — 1923-1951

(Tons raw sugar per acre)

N.Z. GEOGRAPHER, OCTOBER 1953

Fig. 4. Raw-sugar yields per acre by regions, 1923-1951.

The recent development of the Northern Region is further reflected in the high proportion of farmers of south European descent. It reaches a maximum in the Ingham district where Italian settlers now farm three-quarters of the former estates of the Colonial Sugar Refinery Company. The average for the whole area is nearly a half. This proportion is approached only in the Lower Burdekin.

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[6] Figures 2 and 3 were compiled from statistics kindly supplied by J. M. MacGibbon, technical member of the Central Cane Prices Board.

The latitudinal extent of the region has produced transport problems, if not in the movement of cane, at least in the disposal of raw sugar. The use of the ports at Lucinda and Townsville by the three southern mills affords some relief, and the availability of the secondary harbours at Port Douglas (Mossman) and Mourilyan (Innisfail) eases pressure on the railway system, but transhipment at Cairns by seven of the ten mills creates a bottleneck (with a consequent deterioration of raw sugar) that can best be met by bulk handling.

With two exceptions[7] the lowlands of this northern area are dominated by the highly-specialised, monocultural development based on cane sugar (*Fig.* 7).[8] For the most part, cane lands are isolated from areas where other agricultural economies occur by steep slopes clothed in dense rainforest. West of Cairns, however, maize cropping, tobacco growing and dairying of the Atherton Tableland penetrate this forest barrier to contribute to the commercial importance of Cairns, the rise of which, at the expense of the earlier Port Douglas, dates from the opening of rail communications with this restricted hinterland. The contribution of cane to the overall geographic character of the area is thus only slightly restricted.

Lower Burdekin Region

The Lower Burdekin ranks fourth in area cultivated, but yields have been consistently higher than in any other area (*Fig.* 4). The soils of the Burdekin delta are rich and fertile. The success of cane farming, however, has been due more to engineering ingenuity than to favourable physical environment. The prosperity of the industry is essentially a reflection of the easily accessible supply of subartesian water. The Lower Burdekin is unique among the sugar-growing regions of the state in the widespread use of irrigation.

Rainfall is low and uncertain. The annual average of forty inches is close to the lower limit set by the cane varieties at present in use, whilst the high variability of precipitation means that in many seasons falls total less than this critical amount. The seasonal and annual deficiency, however, is met by the use of water from the subsurface sand drifts marking the old water channels through the delta. Six-inch bores, sunk to a depth averaging less than fifteen feet, are operated

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[7] In the south where adjacent savanna grasslands are used for extensive cattle ranching, and in the Utchee Creek area west of Innisfail where dairying fights a rearguard action against encroaching cane.

[8] Figures 7 and 8 are based on land-use maps of Queensland published by the State Bureau of Investigation.

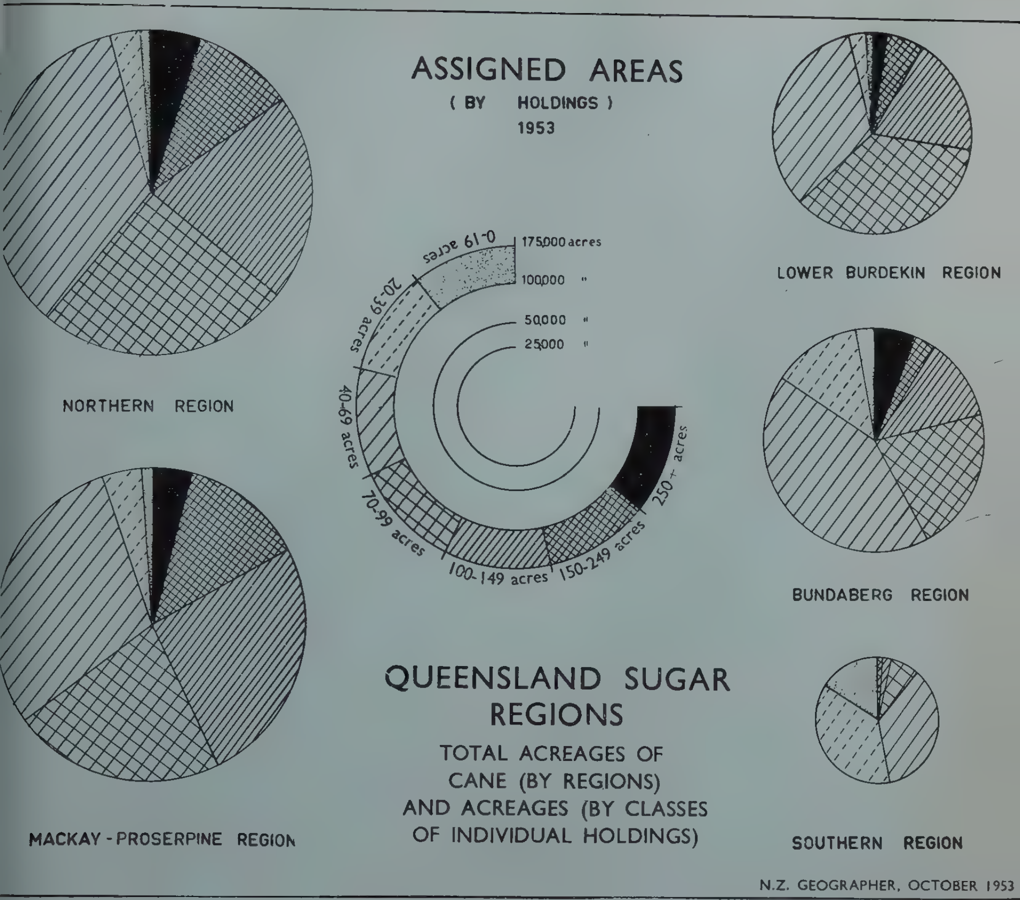

Fig. 5. Acreages under cane by size of holdings in assigned areas.

by a government-controlled supply of electric power south of the river and by individual diesel units to the north. Despite some restrictions resulting from power shortages in the southern area, water generally is cheaper to produce than is the cost of the labour to control it, and over-irrigation is a common fault. The result is a puddling of soils and a deterioration in their water-absorbing capacity. This is aggravated by the universal burning of trash with the consequent ash accumulation. Puddling often produces the paradox of drought-stricken crops penetrated by water-filled ditches. The low-lying nature of the cane lands, moreover, combined with the intensity of summer rainfall, frequently result in flooding, thereby rendering the bores inoperative.

Despite these problems, the system allows a control of the crop not enjoyed elsewhere, and despite the high cost, the delta cane farmer has the unique advantage of being able to forecast his income with reasonable accuracy. In this, the delta differs from the smaller

Houghton River district to the north where irrigation is the exception and where production, in consequence, fluctuates widely both in total amount and in yield per acre. Not all the delta is suitable for irrigation.[9] Salt infiltration along the coastal strip has made the growers there as dependent on climate as those at Houghton River, whilst difficulties of levelling result in some patches of unused land in what is otherwise a compactly-farmed landscape.

Although irrigation techniques have failed to reduce farm sizes below those typical of the Northern Region, they do result in certain significant changes in methods of production. The constant furrowing needed in the irrigation ditches is used instead of weedicides to combat the nutgrass infestation which is a serious problem. Tilling-up the soil for irrigation, however, involves the raising of stools, with the risk of toppling on the second ratoon and difficulties in harvesting. As a result, ratooning is not a common practice in the Lower Burdekin, the excessive proportion of plant cane adding further to production costs. This practice is, to some degree, a sop to the demands of harvest labour. As in the Northern Region, the dominant Trojan variety grows too high to be harvested effectively by present mechanical means, and hand cutting is the general rule. The labour shortage is aggravated by the seasonal competition of such crops as potatoes and tobacco, and this forces the grower to consider the cutter in the production of his crop. Nor is the green manure crop, allowed for in the assignment system, extensively grown. Under the existing crop rotation, legumes can be grown only in the wet season when crop failures are common. The resulting nitrogen deficiency in Burdekin soils must be met by the widespread use of artificial fertilisers.

The majority of farms are from forty to a hundred acres in extent. There are few assigned holdings of less than twenty acres and only four percent of the total is held in blocks exceeding 250 acres (*Fig.* 5). The three proprietary mills and the small estate attached to the Kalamia mill remain as the sole evidence of the former plantation economy. Again the southern European element contributes to regional production, some forty percent of assignees being of Italian descent.

The possibilities of extended settlement based on arable agriculture in the Lower Burdekin have been fully explored.[10] A scheme to irrigate 500,000 acres for 3,600 new farms on the levee and heavy soils to the west and south of the delta is at present in the early stages of development (*Fig.* 7). The completed scheme does not, however, contemplate any extension or reduction of the present sugar-cane areas, and further settlement will be based on the commercial cropping of cereals and cotton associated with livestock fattening on irrigated pastures. Except on the tobacco-growing areas, including the present area at Clare twenty miles upstream, rural population densities will be lower than those of the delta, though much greater than the surrounding area of extensive ranching. The result will be better transport and social amenities for the present cane region. And they will be founded not on a dangerous monoculture as at present, but on a diversity of land use. The Lower Burdekin will continue to stand out as an area of controlled and guaranteed production, although it is unlikely to rival in output the Northern and the Mackay-Proserpine Regions.

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[9] Of the 50,000 acres assigned to cane, 40,000 acres are recorded as irrigated.
[10] *The Burdekin River Irrigation, Hydro-electric and Flood Mitigation Project,* Brisbane, 1951.

Fig. 6. Channel irrigation in the Burdekin Region.

MACKAY-PROSERPINE REGION

The eight mills and 2000 growers of the Mackay-Proserpine Region together produce a quarter of the sugar in Queensland. A long history, a large assigned area, and recent expansion based on improved varieties give some validity to the claim that the region is the 'centre of the

Queensland Sugar Bowl',[11] but it has some difficulties of production, restricted areas of good soil and its yields are low. Although total assigned areas are almost equal to those of the Northern Region, regional mill peaks aim at only half the sugar production of the Mossman-Ingham lands. The heart of the region is the alluvial land of the drainage basin of the Pioneer River which reaches the sea immediately south of the artificial harbour at Mackay, but important outliers exist on the alluvium of the Proserpine River to the north and the smaller basins such as that of Plane Creek (Sarina) to the south.

The Mackay-Proserpine Region has more variety than the two northern areas. It extends from its centre through a series of narrow basins and valleys, and the assigned lands are at no time far removed from the present water courses. Intervening areas are used for dairying on exotic paspalum and guinea grass pastures or for extensive grazing of beef cattle on the indigenous savanna grasslands (*Fig.* 8). Although on cane farms cane production is a monocultural economy, the variety of agricultural land use in neighbouring districts combines with accessible mineral deposits within the immediate hinterland to give a wider base to the economy of the area than is at present characteristic of the northern regions.

The dispersed nature of the cane lands is a reflection of the complexity of soil patterns and the restricted areas of good soil. Apart from the river silts, soils generally are lacking in structure, alternating from a loose dust in the dry season to a muddy slurry in the wet. The demand for good cane soils is such that some climatic handicaps are tolerated in the inland valleys. The greyish sandy loams derived from podsolic alluvium on the south bank of the middle and lower reaches of the Pioneer River are the only really fertile soils. Elsewhere clay subsoils at shallow and variable depth determine the value of the land for cane production. Immediately north of the Pioneer sandy loams of low water-holding capacity and on slopes as steep as thirty percent are cropped for yields which, in this broken country, are low. To the southwest gravel subsoils promote good drainage where it is least required. Only on the river flats does the landscape recall the compactness of the northern sugar regions.

The decline of the early plantation system with its kanaka labour has accentuated this dispersal. Higher labour costs have forced cane production on to the better soils, and the present century has witnessed

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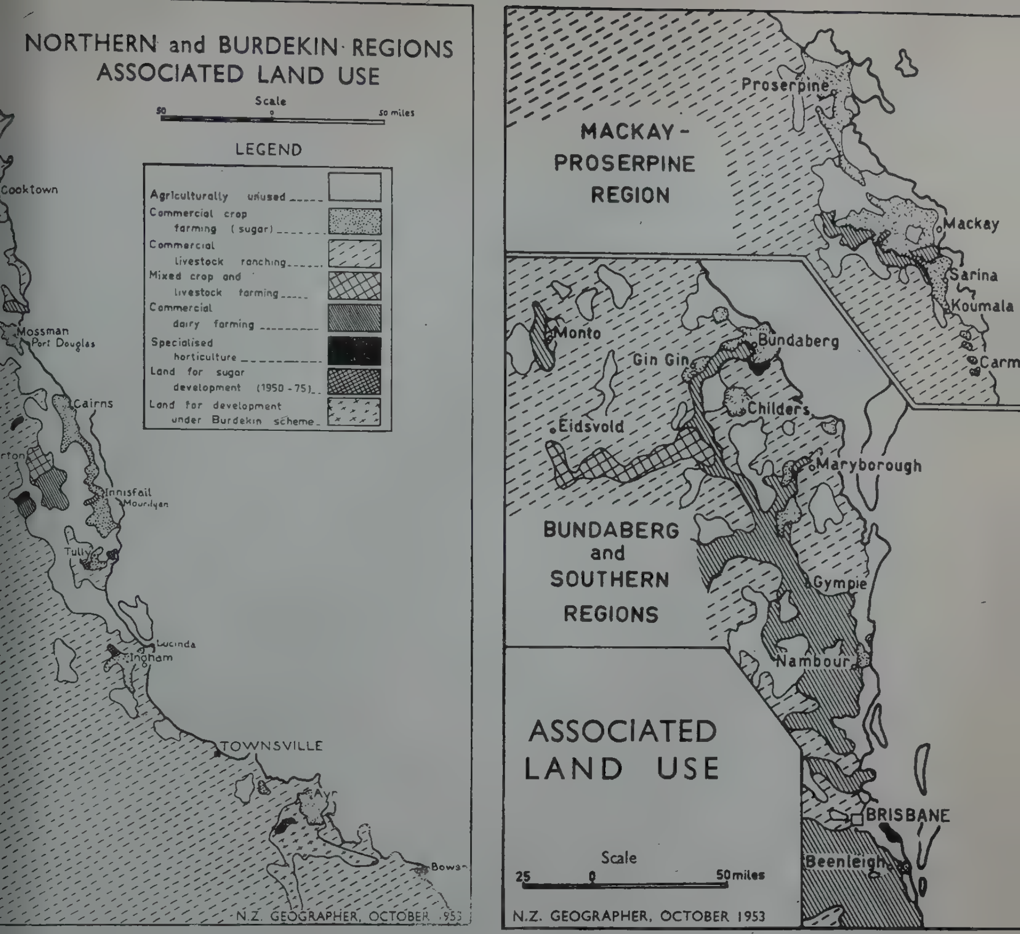
[11] *Australian Sugar Year Book,* Brisbane, 1953, p. 405.



Figs. 7 *and* 8. Land use in the Northern, Burdekin, Mackay-Proserpine, Bundaberg and Southern Regions. (The legend in *Fig.* 7 applies also to *Fig.* 8.)

migration away from the steeper slopes and poorer soils, which are now reverting to second growth. The widespread dispersal of cane land has led to processing problems. Higher transport costs are the result, and there is a need for much smaller mills than occur in the northern regions.

Apart from the possibility of winter frosts in the inland valleys, the main climatic problem is the possible lack of spring rains in the average annual total of sixty-five inches. High intensities reduce the effectiveness of such precipitation and combine with the lack of soil depth in much of the area to create serious drought problems in a shallow-rooting crop. Despite this climatic hazard, irrigation is not a standard practice and is confined almost exclusively to individual schemes on a limited part of the south bank of the lower Pioneer River. In other areas attempts to irrigate have been frustrated by a falling water table in the critical spring period, or have been rendered impracticable by poor subsoil drainage.

The Mackay-Proserpine Region initiated the white labour experiment and it saw the beginning of the central mill system based on small owner-operated holdings. All eight of the existing mills are cooperative concerns, and there is a consequent lack of large holdings, less than one percent of the total being in excess of 250 acres. Seventy-five percent of the total area is contained in holdings between forty and 150 acres in size. Such holdings can be worked independently of non-family labour except for harvesting.

Growers of south European descent again contribute to regional production. In contrast to the Italian element in the two northern regions, however, the migrants are here of Maltese origin. Settling originally on the poorer soils of the Habana district, they are today moving on to the better river silts so that, whilst comprising a quarter of all growers, they produce more than a quarter of the region's cane.

More than any other sugar region, the Mackay-Proserpine Region is well served by an excellent deepwater harbour. With ample provision for possible expansion and the installation of bulk-handling machinery, the artificial harbour alleviates the bottleneck in raw sugar transport that confronts the northern regions.

More so than in the Northern and Lower Burdekin districts, recent increases in cane production in the Mackay-Proserpine Region is a reflection of advances in scientific cane breeding. The economic use of much of the poorer land in the area is the outcome of the introduction of the variety Q.50, which now accounts for more than seventy percent of the cane grown. The rise in per-acre yield and regional production in the 1947 season is the result of this (*Figs.* 3 and 4),[12] and the new cane has done much to mask the effect of soil exhaustion in the poorer areas. Per-acre yields suggest that, fundamentally, the less fertile assigned lands in this region are better suited to some other form of land use or to some modification of the present system. The present land-use pattern indicates that a mixed economy based on a rotation of cane and improved pastures would prove more satisfactory from the long-term viewpoint of soil improvement. Too great a dependence on the cane breeder to cover up fundamental defects in land use may eventually produce disastrous results.[13]

These agricultural practices, moreover, would give some measure of control to such weeds as nutgrass which at present, combated by mechanical rather than chemical methods, add to labour needs and costs of production. Bedding-up from a six-inch drain every sixteen rows gives better drainage and deeper soils in those areas where clay subsoils reach a critical depth, but the continuing struggle against drought on the one hand and waterlogged cane on the other suggests that despite the present programme of a thirty-eight percent expansion of assigned land, even with new varieties of cane, production in the area should be restricted. Any future alteration in the place of sugar production in the regional economy, however, is closely tied up with the assignment system and the reluctance of farmers to relinquish land approved for the cultivation of a crop where guaranteed sales, if not guaranteed yields, are a distinctive feature. Under these circumstances, the present dangerous monocultural system will continue and the success of cane breeding will be looked to for the solution of future production problems, rather than to the fundamental need for a review of an economy based on soils to which it is ill-fitted.

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[12] The general decline in production common to all districts in 1951 is a reflection of the severe drought of that year.

[13] N. J. King: 'Are We depending too much on New Cane Varieties?' *Cane Growers' Quarterly Bulletin,* Vol. 16, No. 2, October 1952, pp. 53-55.

Bundaberg Region

Criticism of the dominant economy on the cane lands of the lower Burnett and the adjacent areas of Gin Gin and Childers is less justified. One of the earliest areas developed for sugar, the Bundaberg Region has a long history of monoculture without any sign that soils are failing to stand up to the practice. On the contrary, irrigation techniques should raise the present high level of production. The region is unique in that here alone are combined all phases of the sugar industry, in terms both of its history and its manufacture. The Millaquin company's refinery is the only Australian refinery operating outside the state capitals, while the Fairymead estate is practically the sole survivor of the old plantation system upon which the industry was founded.

Rainfall totals (about forty-four inches) are not much in excess of those of the Lower Burdekin where irrigation is needed. But the better seasonal distribution of precipitation, particularly in spring, and the lower intensities and increased effectiveness of rainfall in this extra-tropical area, enable the Burdekin Region to produce fairly heavy crops without supplementary water supplies. It is estimated, however, that yields could be increased by as much as fifty percent when irrigation is made possible by the rural electricity reticulation now being established in the area. The higher latitude increases the frost hazard, particularly with autumn-planted cane, but the use of early maturing varieties to some extent counteracts this.

Soils are much more uniform than in the Mackay-Proserpine Region. The best of the assigned lands are the volcanic loams—red in the drier phase, brown in the wetter of good depth, excellent tilth and adequate drainage—which cover the greater part of the cane lands south of the Burnett and east of Bundaberg. In common with the alluvial soils to the north at Gin Gin and at Childers these volcanic loams are rich in all plant foods except nitrogen. On the heavier alluvium at Fairymead poor natural drainage creates some problems in maintaining a good tilth, but extensive drainage schemes overcome this in all but excessively wet years.

Yields per acre on these soils are only half those of the controlled Burdekin production, though in most years they compare favourably with those of the Northern Region (*Fig.* 4). Total production is similar to that of the less extensive Burdekin area. It is about fifteen percent of the Queensland total.

Bundaberg is the spiritual home of the plantation system although it is, of the true sugar regions, the only extratropical area. Slowly in the 1870's, and more rapidly later, sugar growing expanded until by 1888 some twenty-two complete mills and fourteen juice mills each with its associated plantation had been established in the area.[14] After 1900 the amalgamation of mills and the break-up of estates took place rapidly. Of the five existing mills only the three proprietary mills have associated plantations, and together with the two cooperative mills they draw cane from over 2000 independent growers. The 8000-acre Fairymead estate is the only real survivor of the system in which the bulk of the mill cane was grown on the associated plantation. Even this relic is undergoing change. Transport costs have caused the relinquishment of part of the Fairymead estate assignment in the Childers district in return for added assignments from thirty growers to be established on the area undergoing extensive drainage near the mill. The change will result in a reduction of company-grown cane from three-quarters to a half of the total crushed. The existence of the plantation system and the associated larger holdings allows some small departure in the Bundaberg area from the generally universal dependence on harvest labour. At Fairymead mechanical harvesters are frequently used, though badly-lodged cane fre-

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[14] C. H. O'Brien: 'The History of the Australian Sugar Industry: Bundaberg', *Australian Sugar Journal,* Vol. 43, Nos. 7 and 8, 1951.

Fig. 9. Sugar-cane lands along the lower Burnett.

quently results in a reversion to hand methods. Here, too, and at the weir scheme at Bingera, twelve miles upstream from Bundaberg, is the only extensive use of irrigation.

The bulk of the land assigned, however, is contained in holdings of less than 150 acres. The expansion scheme allows for a forty-three percent increase—greater than in any other area—though this will be achieved more by increasing assignments on present holdings than by granting new assignments. The result will be a filling-in, rather than an expansion, of the area where sugar is dominant.

Despite the contiguous dairying and livestock ranching, the Bundaberg region is essentially a highly specialised monocultural area. Present communications, in particular the railway system, focus on Maryborough as the port for the upper Burnett area and leave only a new and restricted tobacco economy at Clare to modify the overwhelming dominance of sugar in the economic and social life of the region. Present policy, especially the 1953 expansion programme, merely strengthens this monocultural hegemony.

SOUTHERN REGION

South of Maryborough favoured pockets of alluvial soils are utilised for cane production in an economy which differs strikingly from the monocultural practices of areas to the north. Including the Northern Rivers area of New South Wales, where cane production is of similar character, the total area involved accounts for only six percent of the assigned sugar lands in the commonwealth, although a higher yield per acre than that at Mackay-Proserpine results in a regional contribution of some eight percent of the commonwealth total of raw sugar.

Cane cultivation in the Queensland portion of the region is restricted to the floodplain silts of the Mary, Maroochy and Logan Rivers (*Fig.* 8).

Climatic hazards, and especially frost, separate the area from those to the north, and the spring drought is not so serious as elsewhere. Despite a rainfall of only forty-five inches, lower intensities increase its effectiveness, and its seasonal distribution is more favourable to cane growth. Although new varieties account for a slight increase in production in postwar years, regional sugar output has shown relative stability over the past twenty-five years and contrasts with the wide fluctuations in output in the monocultural areas to the north.

Crop fluctuations in this southern region, moreover, carry little of the economic significance of similar changes in the north, for cane cultivation here is but part of a varied economy. It fits into a rotation system involving improved pastures for dairy cattle. Livestock products, therefore, form the basis of farm income, sugar cane providing a supplementary cash crop, and as a result of this mixed economy, assignments of less than twenty acres form a much greater part of the total acreage than elsewhere. Few assignments exceed seventy acres.

In much of the region the cost of transporting cane for processing is proving prohibitive. The recent defection of the Mt. Bauple mill, for example, followed a long period of financial loss. The transfer of assignees to the Maryborough mill only aggravates the situation and many of these growers are relinquishing their assignment rights. Near Beenleigh the small Rocky Point mill, crushing cane from 2700 acres and 197 suppliers, is faced with similar losses unless further assignments are granted. This decline in the Southern Region is attributable more to the fact that mill supplies are no longer economic to process than to the mixed economy of individual holdings. Under present circumstances there is a minimum limit to the economic size of the operations of a crushing mill and this has been reached by some of the mills in the area. In contrast to this, however, increased milling facilities and assignments at the Maryborough mill ensure its future prosperity. Provided there are processing facilities within economic distance, the steady production and relatively high per-acre yields (despite frost hazards) suggest that the economic variety and crop rotation characteristic of the area has much to commend it. Contrary to the pattern of sugar production in the north, cane growing in this southern region plays only a minor role in a diversified economy.

Prospects

The economic hegemony of sugar cane in the four northern regions will be further strengthened by the present expansion programme designed to meet the overseas commitments outlined in the British Commonwealth Sugar Agreement of 1949 and the needs of an internal market expanded by the current Australian immigration policy. The changes will strengthen the relationships already existing between the regions and, following the pattern set by the industry since its inception, will shift the emphasis of sugar production northward. Although the economics of mill construction and duplication demand that expansion shall take place within present mill areas and that the northern limit of cane production will still be drawn at Mossman, the suggested establishment of new cane lands in the Ingham, and possibly Tully, areas will lead to the increased importance of the Northern Region at the expense of other areas. Elsewhere expansion will be achieved by the filling-in of the areas already defined and by yet further attempts to increase yields from lands already in production. The changed circumstances of postwar years have thus given further impetus to the settlement of tropical Australia.

However, modifications to the commonwealth immigration scheme and the threat of overproduction in other sugar-producing areas and of possible international agreements is already affecting the issue.[15] Sugar production can be dangerously overemphasised as the only method of effecting close settlement of tropical Australia. The social and agricultural dangers of the system are obvious. Moreover, present experiments in tropical crops and pastures suggest that monocultural practices are by no means inevitable.[16] Except in the Bundaberg Region the possibilities of other forms of arable agriculture in the sugar areas have never been explored. The successful establishment of reliable pasture mixtures in the coastal belt could mean an annual turn-off of 30,000 fat stock, an alleviation of the present drought problems of northern graziers, and an opportunity for building up a more satisfactory meat export trade. It is not suggested that other forms of agriculture will oust sugar cane from the already established areas, but 'changed circumstance' both in agricultural techniques and in world demand suggests that the accepted idea of the inevitability of the coalition between sugar and settlement in coastal Queensland should be closely and critically reviewed.

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[15] The need for opening up new lands and for duplicating the Tully milling train, as recommended by the Royal Commission of 1950, is no longer thought necessary.

[16] T. G. Graham: 'Activities of the Bureau of Tropical Agriculture', *Queensland Agricultural Journal,* Vol. 66, 1948, pp. 69–81; and *idem:* 'Tropical Pasture Investigations', *ibid.* Vol. 73, 1951, pp. 311–326.

POPULATION AND LAND USE IN THE SYDNEY DISTRICT: 1788-1820[*]

K. W. ROBINSON

STUDY of the origins and development of Sydney presents a number of problems which are related to its peculiar character as a convict settlement and to the great distance which separated it from the mother country. It is proposed to outline here some of the problems associated particularly with population distribution and land utilisation during the first thirty years of the colony of New South Wales and to examine the reasons for their existence.

No understanding of the progress of events is possible without an appreciation of the serious limitations set by the physical environment, more especially by soils and relief.[1] Most of the useful alluvial soil, lying along the Nepean-Hawksbury River, was more than thirty miles away from the site of the settlement on Sydney Cove. The country between consisted either of undulating lowland developed on shale or of youthfully-dissected uplands. The inhibiting effect of these barren uplands can be seen to this day, when they remain as national parks, water storage areas, or areas of sparse settlement fringing the metropolis.

The shale country, though much better than the plateaus in respect of soil cover and slope, was by no means high-class, and much of it, indeed, is still under rough grazing. Most of the soils are still shallow, intractable, and deficient in plant foods, although there are occasional pockets of better soil marked by more intensive forms of utilisation. At the time of white occupation, there was a continuous, and in some cases dense, cover of dry schlerophyll forest and woodland which made travel more hazardous and agriculture more difficult. The fickleness of the climate, and the home government's inadequate provision for agriculture, were no more than supplementary to the problems provided by the physical environment.

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[*] Expenses incurred in the course of this investigation were met from the Commonwealth Research Grant.

[1] More detailed physical description is included in the following: 'Notes on the Geology and Physiography of the Sydney Region', in *Aust. & N.Z. Assoc. Adv. Sci. Handbook for New South Wales,* 1932; L. D. Hall: 'The Physiography and Geography of the Hawkesbury River between Windsor and Wiseman's Ferry', *Proc. Linn. Soc. of N.S.W.,* Vol. 51, pt. 4, 1926, pp. 559-593; G. D. Osborne: 'A Review of Some Aspects of the Stratigraphy, Structure and Physiography of the Sydney Basin', *ibid.,* Vol. 73, 1948, pp. iv-xxxvii; T. G. Taylor: 'The Warped Littoral around Sydney', *Journ. & Proc. Roy. Soc. of N.S.W.,* Vol. 47, 1923, pp. 58-79.

MAP RECORD OF EXPANDING OCCUPATION

The spread of settlement as shown on the map (*Fig.* 1)[2] underlines the uneven distribution of physical resources; yet it also reflects the circumstances of occupation, and serves as a rough measure of the influence of successive governors on land policy. Thus, the first period (1788-1796) covers the establishment of initial nucleii under Governor Phillip and the stop-gap administration of Grose and Paterson. Governor Hunter made no grants until late in 1796, so that all his additions, and those of Governor King (1800-1806), appear under the second period (1796-1806). Of those who followed King, Bligh apparently made no grants, Foveaux made only a few, which were carefully selected, while all Paterson's issue were recalled and redistributed under Governor Macquarie's authority in 1811. Consequently, the third period (1806-1813) virtually represents the early years of Macquarie's term (1810-1821), while his later years are covered by the final period. Within this framework, the map provides a dynamic picture of the expansion of settlement as expressed by land grants.

During the first period of eight years, settlement occurred mainly near the Parramatta River and along the harbour to the south, west and northwest of Sydney, forming an 'inner' zone. The north side of the harbour was practically unoccupied; but eighteen miles to the west at Prospect and still further afield along the Hawkesbury, good soil had attracted more substantial occupation. By the end of another decade (1806), there was a marked expansion from these early clusters, notably along the Nepean-Hawkesbury River and along the road linking those settlements with Parramatta (*Fig.* 4). During the same period, new areas developed in the south at Bankstown and near George's River, where there were additional pockets of alluvial soil. The progress of grazing was reflected in the allocation of five government reserves totalling 105,000 acres, and six areas of common land (leased or granted), totalling 35,305 acres (*Fig.* 2).

The next seven years (1806-1813) were marked by extensive occupation of the south and southwest, and further developments along

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[2] The map is a compilation partly from early maps, and partly from the following records: C. Grimes: 'Plan of the Settlements, 1796', *Hist. Rec. of N.S.W.*, Vol. 3; *idem:* 'Map of New South Wales, 1806', *ibid.*, Vol. 6, p. 410; J. Burr and G. Ballisat: *Plan of the Allotments of Ground granted from the Crown in New South Wales*, 1814; *Accurate List of the Landholders in the Colony of New South Wales corrected in 1813;* 'Recurn of Grants made in New South Wales, 25th August 1812-25th March 1821', in *Hist. Rec. of Aust.*, Vol. 10 (Series 1), pp. 560-566.

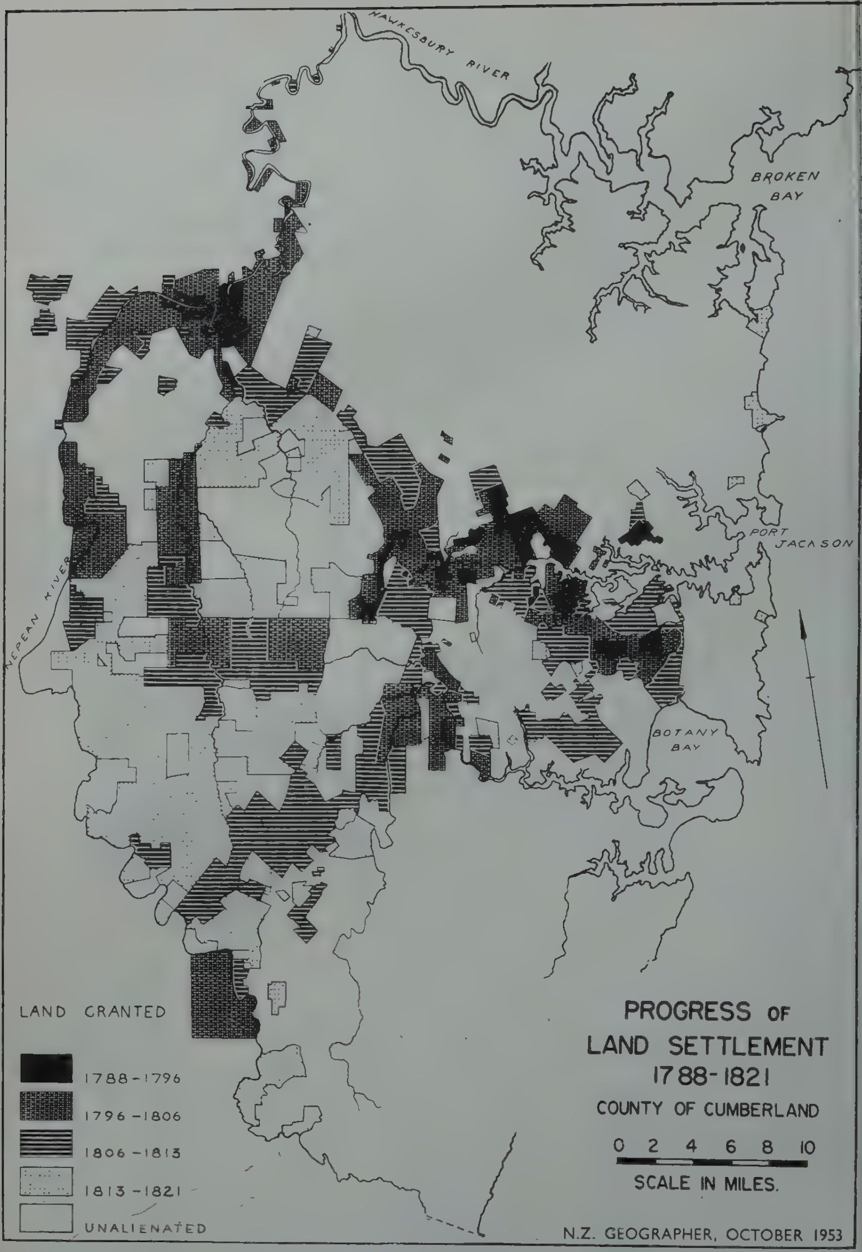

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Fig. 1. Progress of land settlement in the County of Cumberland, 1788-1821.

the Sydney-Windsor highway. Many of these grants were of a relatively large size, partly because of the poor quality of the land and partly as a gesture to a few gentlemen settlers and the better types of emancipist. As this expansion proceeded, the restraining influence of the sandstone plateaus to the north and south of Sydney became more and more apparent. From 1813-1821 there was a comparative absence of new grants within a radius of eighteen miles in any direction around Sydney; but substantial areas to the southwest were alienated, government grazing lands were greatly reduced in size, and several arterial roads appeared. A fan pattern of occupation west of Parramatta was now clearly defined, although many of the best sites of the future metropolis were waste land, and remained so for long afterwards.

Although this may seem an impressive achievement for a generation, it does not represent a vast influx of people; rather, it emphasises the early development of extensive methods in the colony's rural industries.

GROWTH AND MOVEMENT OF POPULATION

Growth and movement can be measured by reference to returns from the four districts in which musters were taken—Sydney, Parramatta, Windsor and Liverpool (*Fig.* 3). The sum of their total populations represents the total of the County of Cumberland, and, even in 1820, a very large proportion of the total population of Australia. Numbers grew from 1715 in 1790 (the date of the first reliable muster returns) to 27,931 in 1821, when there was a density of approximately eleven to the square mile. This represents an average rate of growth of less than a thousand a year, which, though rapid when measured by the standards of a mature population, is slow in terms of a dynamic colonising project.

A most striking feature was the irregularity of growth, reflecting early tribulations and uncertainties. Thus, the population of Parramatta rose to almost 2000 in 1792, but had dropped to little over 1000 by 1796[3] as a result of fluctuations in farming, movements of the military establishment and the beginning of settlement along the Hawkesbury. By contrast, Sydney's progress during the period was steady, for the settlement absorbed most of the few additional arrivals in the colony after Phillip's departure in 1792.

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[3] Figures do not refer to *towns* but to the mustering centres, which were sometimes mistaken for towns. Thus Marion Phillips in *Colonial Autocracy*, p. 149, gives Sydney's 1820 population as 12,079, which was the total for the whole muster district. W. C. Wentworth's estimate for 1819 was 'not above 7,000'.

There are numerous obstacles to the accurate measurement of population. Records are incomplete for some years (1797, 1798, 1808, 1809 are missing; 1791, 1794, 1802, 1803, 1806, 1807, 1818, 1820 have no detailed accounts for the districts). Some of the gaps have been filled by reference to the following: D. D. Mann: *The Present Picture of New South Wales,* 1811; W. C. Wentworth: *Statistical, Historical & Political Description of New South Wales,* 1819; J. T. Bigge: *Report on the State of Agriculture & Trade in New South Wales,* 1823.

Furthermore, there was lack of continuity in the recording. Thus, on some occasions, those receiving rations were classified according to location, but those independent of the stores were not. Only on a few occasions were children classified according to age and sex, and on some occasions the maximum age of children was not specified. The short-term objective of the musters was to check the numbers receiving rations, so they are generally ill-suited to the long-term requirements of demographic study.

Nothing approaching a modern census occurred until 1820, when a distinction was made between four main groups (Table I). There was no discrimination between the children of convicts and others, and no age given for the children. Muster stations give only an approximate indication of the areas from which the residents were drawn. Even in 1821, population returns were listed under only four districts, although by that time a distinct pattern of local government boundaries had evolved, enclosing practically the whole county. Some of these divisions were, in fact, used for stock returns, so that it is possible to get a more accurate picture of the distribution of animals than of people. See T. A. Coughlan: *General Report of the Eleventh Census, New South Wales,* 1894.

Although the overall rate of growth slackened during the next ten years, it showed phases corresponding with fluctuations in transportation and emigration, and, more particularly, the influence of the brief European peace between 1800 and 1803. Parramatta, after reaching 2060 in 1801, gradually declined until 1806 as convicts were removed from the district. Concomitantly, Sydney and Windsor appear to have shown steady increases, although the records are obscure. In 1806 Windsor's population exceeded that of Parramatta by 300, reflecting the intensification of settlement along the Hawkesbury and South Creek flats. The short-term fluctuations are in keeping with the characteristics of the population at the time: instability, unbalanced composition, preponderance of immigration over natural increase, and the high degree of direction in movement, which resulted in comparatively rapid 'mass movement' between one locality and another.

During the third period of seven years, there was again a steady increase, only at a rather slower rate than in the previous period. Under Governor Bligh and the second interregnum, Sydney increased rapidly by comparison with Parramatta and Windsor. This was a time of increasingly centralised authority, the advent of a few monied merchants and large-scale landholders, and a dearth of migrants to swell the ranks of peasant farmers. From 1810-1813, this process was reversed; Sydney suffered a relative decline, and did not regain its 1810 level until 1816, whereas Parramatta and especially Windsor increased in stature. Macquarie, on his arrival in 1810, had immediately shown an interest in the development of the outer areas, and as a consequence the combined population of the rural districts in 1813 (6436) was considerably more than that of the Sydney district (5356 —the 1809 level). In 1810 the reverse had been the case, the respective numbers being 4196 and 6158. During the period under review Sydney was not again to account for more than half the total population.

From 1813-1821, the rate of growth increased, though in the rural areas it slackened somewhat in the later years.[4] The relatively rapid rise in total numbers is attributable to an influx of convicts at a steady

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[4] The decline shown on the graph (Fig. 3) may be due entirely to faulty records. There is some uncertainty about figures for 1820, the only authority for which is Bigge.

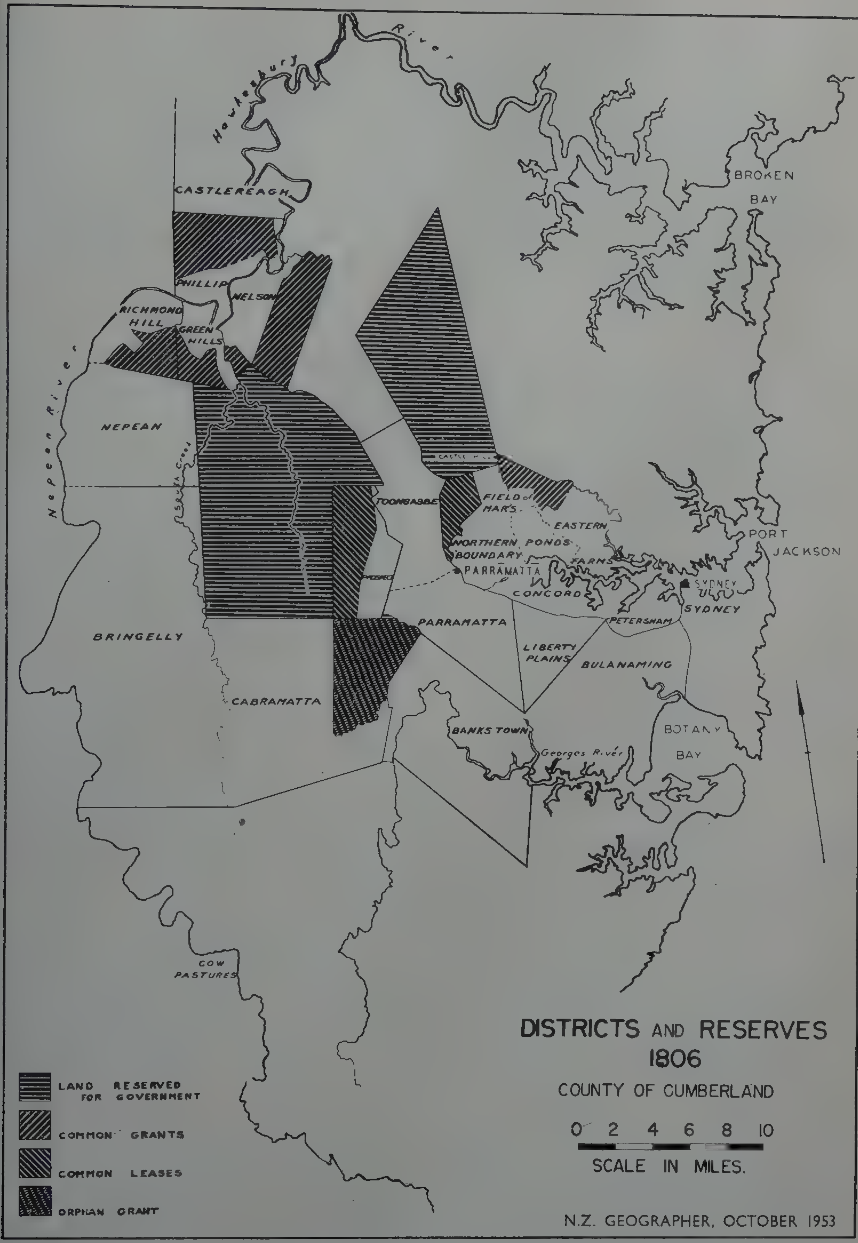

Fig. 2. Districts and reserves in the County of Cumberland, 1806.

rate from 1814 onwards,[5] a steadily increasing stream of free emigrants after the cessation of war in 1815, and the increasing number of families and children leading to a more balanced age and sex composition in the population.

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[5] B. Fitzpatrick in *British Imperialism in Australia* cites an annual average of 2500 persons entering the colony.

Moreover, by this time, the frontiers were widening and more new arrivals, both convict and free, were going to other parts of the colony than to the County of Cumberland. Liverpool, newly established, showed spectacular progress of a kind not experienced by any of the other districts in their early years, and in general there was more correspondence between the patterns of development for each district and for the county as a whole. This is partial evidence that by 1820 there was some stability of settlement.

Population Structure

Inadequate statistics make detailed analysis of the population impracticable, but it need not be stressed that there was a marked lack of balance in age, sex and occupation, and this had pronounced social and economic effects. Even after thirty years this state of affairs was only beginning to be remedied (Table I). The proportion of convicts and ex-convicts was still high, and there was a preponderance of males, both amongst them and amongst the adult population as a whole. Probably the greater portion of the non-convict group, those, that is, classified as children or as 'born in the colony', were the progeny of convicts, so that the number of true colonists and their families was still very small. However, among the free settlers and children alike the ratio of males to females was approaching an even balance. In the case of those born in the colony—that is, to all intents and purposes, the adult children of emancipists—there were fifty-two males to forty-eight females. It is significant, too, that free people now numbered over 10,000; although they accounted for only 37.41 percent of the total, they included all the younger elements. Furthermore, if the numbers of *freed* are added to this, the result is more than half the total.

Population Distribution

The proportion of free settlers is important in considering not only the social effects, but also the degree of freedom of movement, which has some influence on the location of population. For example, throughout this period there were numerous forces making for the clustering of settlers. Emancipists and emigrants with small means gravitated towards the areas of better soil where small-sized farms could be operated economically; convicts were from time to time concentrated on government farms or constructional work which would keep them as an integral part of the nodes of settlement; the site of towns on waterways was also instrumental in attracting the merchant class notable not only in Sydney but also in Parramatta, Windsor and Liverpool.

Against these forces, the strongest element for dispersal lay in the number of settlers whose purses or popularity earned them large grants of land and to whom as a consequence, convict labourers were assigned. It is obvious that the numbers of people who could thus be decentralised to the country were relatively and absolutely small, especially when it is remembered that some of the largest landholders, such as Alexander Riley, had more interests in the city than in the land. On the other hand, decentralisation from Sydney, in response to the influences mentioned above, was quite notable, and was strengthened by the character of many of the outlying settlements as garrison towns. This circumstance was influential in Sydney too, and the relatively large numbers of people living there in 1820 (approximately one quarter of the population) reflect its administrative dominance, its superior commercial

TABLE I

POPULATION: COUNTY OF CUMBERLAND 1821

Group	*Numbers*	*Percentage of Total Population*	*Male Population*	*Percentage of Group Population*	*Female Population*	*Percentage of Group Population*
Free Settlers	1455	5.20	818	56.2	637	43.8
Born in Colony	1853	6.61	887	48.0	966	52.0
Children	7149	25.60	3727	52.1	3422	47.9
Total Non-convict	10,457	37.41	5432	51.5	5025	48.5
Free by Servitude or Absolute Pardon	3977	14.24	2292	57.9	1685	42.1
On Conditional Pardon or Ticket-of-leave	2669	9.54	2267	85.0	402	15.0
Convicts	10,588	38.00	9746	92.1	842	7.9
Total of Convict Origin	17,234	61.78	14,305	83.0	2929	17.0
On Board Ship	240	0.81	—	—	—	—
Total Adult Population	20,542	73.59	16,010	78.00	4534	22.00
Total Population	27,931	100.00	19,737	71.28	7954	28.72

position and the poverty of the surrounding country, which at that time was a poor alternative to the lures of town life for unskilled agriculturalists.

Links with the Present

In relating these aspects of population to present conditions, some striking contrasts and similarities are at once apparent. Without doubt the sex composition of the population was unusual for a colony having the maturity and degree of urbanisation of Sydney in 1820. Yet occupations among the free people and the location of the people as a whole show not only similarities but, in some cases, direct causal connections. Even at that early date there were large numbers of people in the tertiary industries. Although no census returns exist to prove this fact directly, it is obvious indirectly in the large numbers of convicts who, in the main, performed services and required additional members of the community to supervise them; in the large relative population of the towns; in the extensive constructional requirements of a pioneering settlement; in the numbers employed in the civil and military establishments; and in the difficulties of farming, which were in part inherent and in part accentuated by a lack of skilled workers and implements.

These items were not the nucleus of the state's present structure, yet by 1820 Sydney had acquired momentum in administration and commerce which has been maintained and developed in modern times. Similarly, and for the same reasons, there were proportionately fewer people engaged in primary industries than was commonly the case in newly-settled lands. Probably only about one eighth of the people was engaged in agriculture; in the county today the proportion is a little over one percent. This indicates not only the preponderance of the city population but also the relative poverty of the rural-urban fringe, a fact which was realised all too early in the history of settlement.

In 1820 the workers in secondary industry were few, and it is here that the occupational structures of that time and of the present are most widely divergent. The little industry that existed was largely of a processing type designed to supply the local market with consumer goods such as flour, bricks, pottery and clothing.

It is in the location of population that the closest links exist with modern times. Without exception the nodes of settlement then significant have continued up to the present, though with differing emphasis. The sites of towns and townships were determined by the early governors, notably Phillip and Macquarie, and in most cases they were designed to serve an existing population and to attract a new one. This was particularly the case with the towns established under the Macquarie regime—Windsor, Richmond, Pitt Town, Wilberforce, Castlereagh and Liverpool (*Fig.* 4). They were meant to be flood-refuge towns, markets, garrisons and cultural centres; but it is doubtful if any one of them adequately performed these functions in 1820.

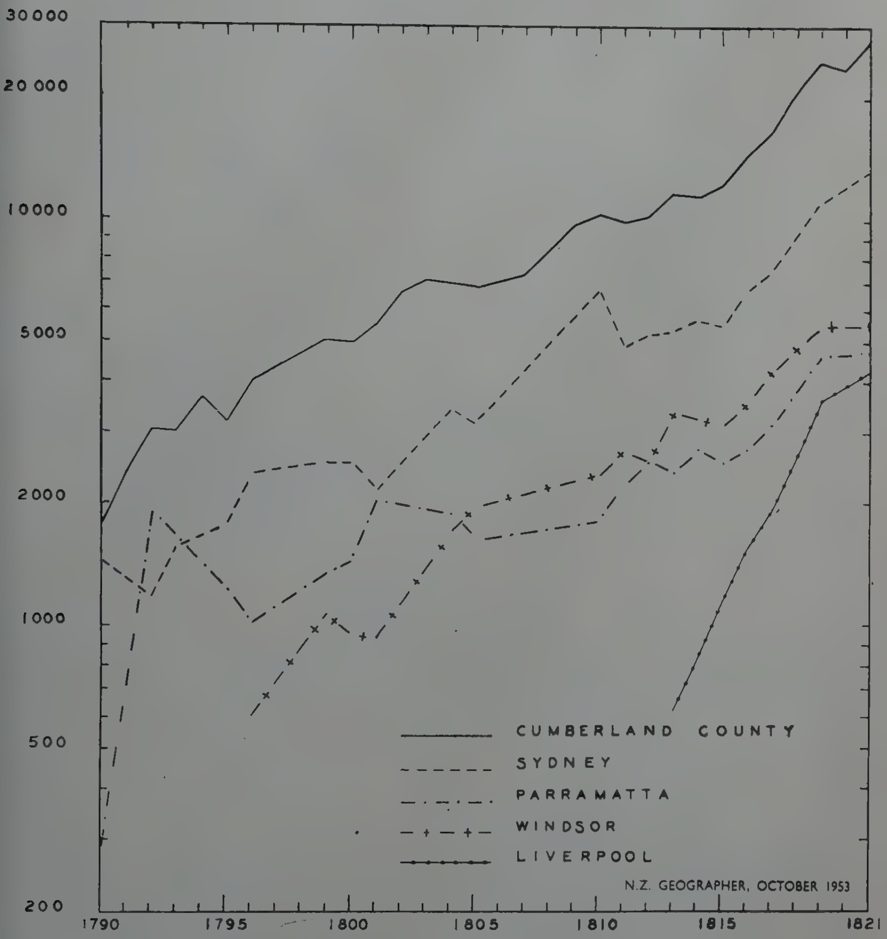

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Fig. 3. Growth of population in the County of Cumberland 1790–1821.

Rural Land Use and Settlement, 1820

The landscape of Sydney and its neighbourhood in 1820 had not advanced much beyond its primeval state. Of more than a million acres, little over one third (388,000) was occupied, and of this third only a small fraction was cleared and in part used for agriculture. Thus statistical evidence alone suggests that the 'natural' landscape was still

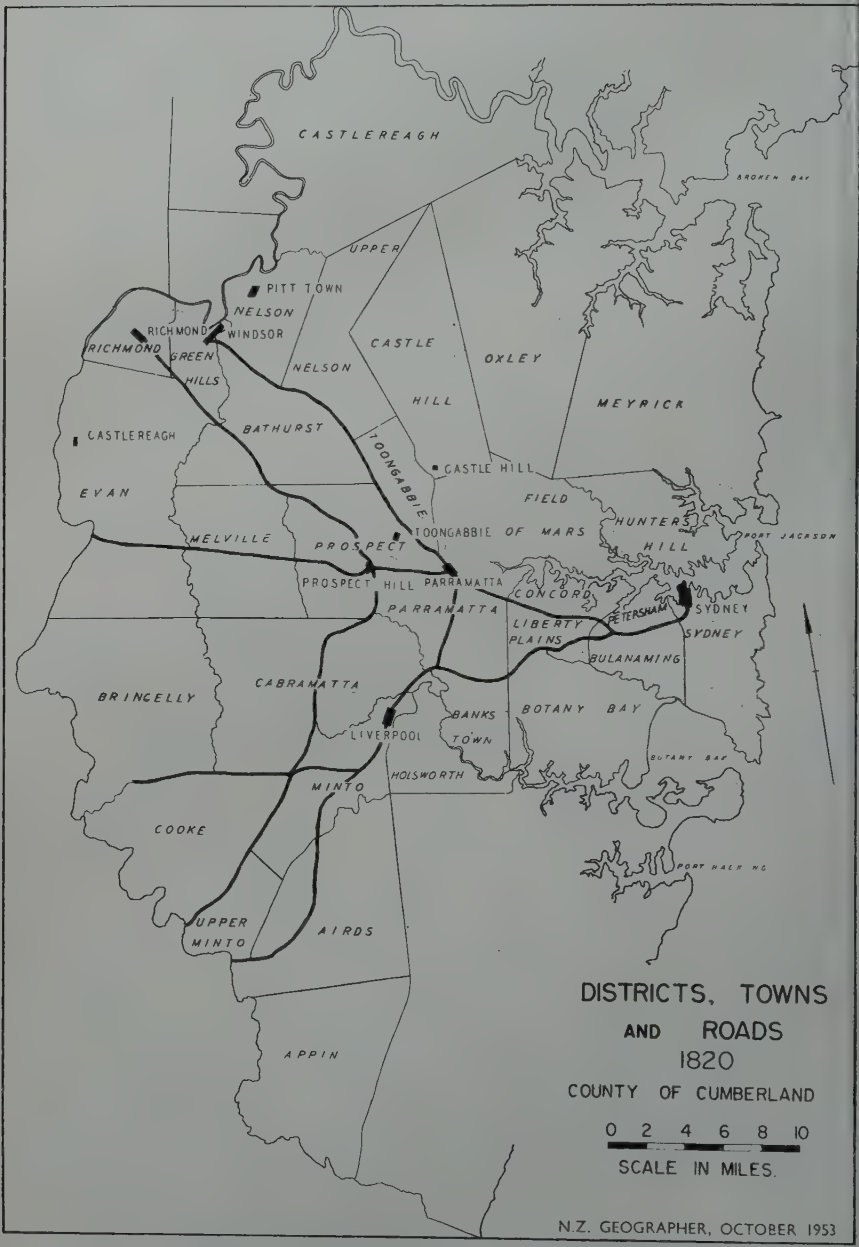

Fig. 4. Districts, towns and roads in the County of Cumberland, 1820.

largely unmodified and that there existed only a series of isolated settlements linked by a primitive road system. A large part of the county still appeared very much as it did before white settlement.

Agriculture, while vital to the life of the colony, occupied only an insignificant part of its total area. Substantial areas of cultivated land in contiguous plots occurred only near the rivers, especially stretches of the George's and of the Nepean-Hawkesbury. Away from the rivers the amount of cultivation dwindled rapidly. In extensive tracts of large holdings—for example, much of the Bringelly, Cooke and Airds districts—there was practically no cultivation at all. Here grazing was conducted on uncleared land, without improved pastures and rarely in conjunction with cultivation. The limited amount of cultivated land reflects the general paucity of the soil and the unreliable rainfall as much as the economic difficulties of inadequate farm size and ignorance.

It is not the purpose of this essay to enumerate the details of farming principles and practice;[6] the obstacles were complex and almost insuperable. In a land suited to large-scale farming, or more often to no farming at all, small men of no means and no knowledge were for long forced to play a dominant role. From time to time 'landed gentry' came to increase the area of occupied land; but they were graziers rather than farmers, and it was to the emancipists and free settlers on small holdings that the colony looked for its continued supply of food.

Agricultural Trends

The failure of this farming venture is reflected in the persistent food shortages and in the relatively small area under crops (*Fig.* 6). Yet even by 1804 (*Fig.* 5) some agricultural characteristics and trends were already well established. They included: the dominance of the Crown as land occupier and owner of cattle; the importance of 'settlers', more than half of whom held less than thirty acres each and were cultivators and owners of goats and hogs; and the significance of the civil and military staff as sheepmen. These last eventually became a group best described as 'large landholders'. Some of these were husbandmen in their own right, some were merchants and businessmen, some continued as civil administrators and some were absentees. There was already a hiatus between agriculturalist and pastoralist. The small settlers were too poor and their holdings too small to permit draught animals or sheep for folding on their fields. They supported only scavengers. At the other end of the scale, John

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[6] See C. J. King: 'The First Fifty Years of Agriculture in New South Wales', *Review of Marketing and Agricultural Economics,* Vol. 16, No. 8, 1948 to Vol. 17, No. 4, 1949.

Macarthur and others were already starting the sheep-raising tradition which was soon to dominate the Australian economy, though sheep have long since ceased to be important in the County of Cumberland.

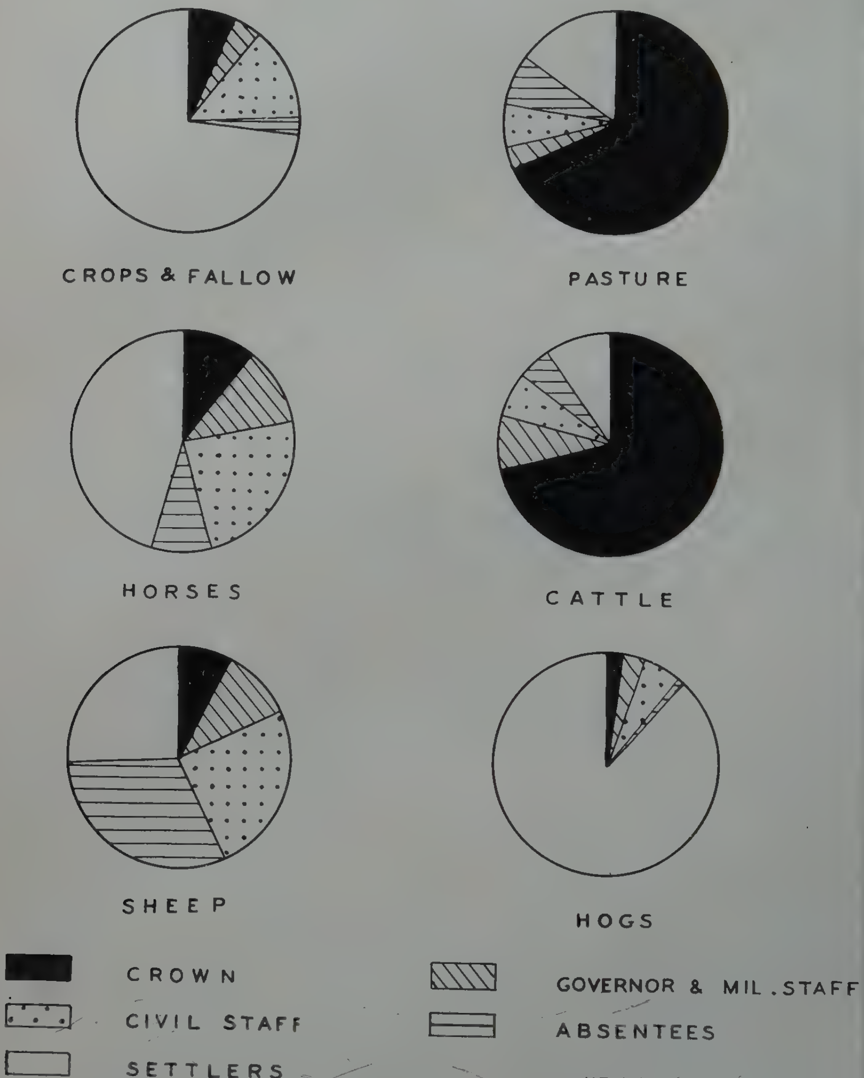

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Fig. 5. Ownership of land and livestock in 1804.

Settlement was even more localised than rural land use. The Sydney district had a centralised society from the beginning—a characteristic which has been strengthened by subsequent events. By 1820 townspeople were living in a number of clusters which were well removed from Sydney, but, with the exception of Parramatta, their numbers were relatively few. Parramatta for long maintained its position as second town because of its proximity to Sydney, its site on a navigable waterway, its position central to a relatively good farming district, its function as the leading gaol of the colony and the momentum which it gained from its very early establishment.

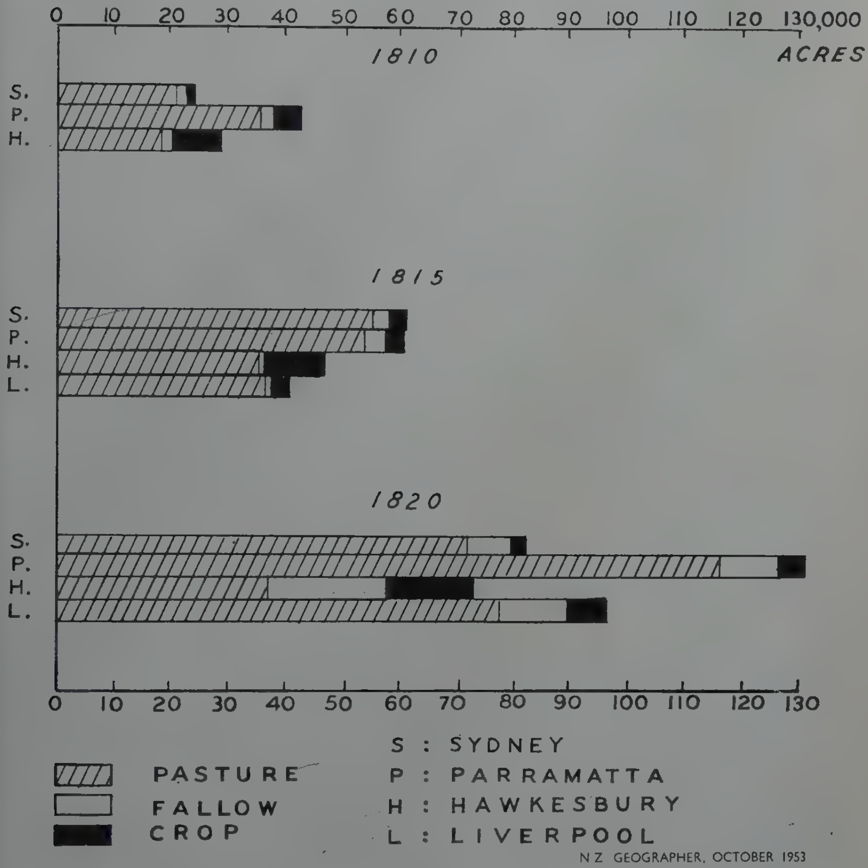

Fig. 6. Land use in districts of the County of Cumberland in 1810, 1815 and 1820.

By the same tokens, the Macquarie towns had gained little in importance by 1820, partly because of the very fact that they were planned on heights away from the farmlands, and hence failed to draw the inhabitants away from their traditional home sites near the river margins. Moreover, in 1820 trade in the colony was still not fluid enough for these towns to be important service centres, and they were at this stage little more than names on a map. Of the six, Windsor was the most advanced; according to an estimate of Wentworth in 1817 its population was about 600, and land values there were about ten percent higher than at Parramatta.

Both Bigge[7] and Wentworth[8] have stressed the lack of progress shown by the outer towns as compared with Sydney. Parramatta was a town of 'inferior traders, publicans, artificers and labourers' whose progress for some years past had been inconsiderable. However, Wentworth saw hope for its future in its position halfway between the flourishing Hawkesbury settlements and Sydney, 'the great mart for colonial produce'. It was a wise forecast, and he was similarly apt with regard to Liverpool:

> the position of the town is all that can be urged in support of the probability of its future progress; the land in its vicinity being in general of a very indifferent quality. It is in a central situation between Sydney, and the fertile districts of Bringelly, Airds, Appin, Bunbury Curran, Cabramatta and Seven Islands [Five Islands or Illawarra?] to which last place the tide of colonisation is at present directing itself.[9]

He had already pointed out that the George's River was navigable for boats of about twenty tons burden as high up as the town. He put the population of this town in 1817 at about 200. Thus it was at that time inferior to Windsor, but strategically better placed, as is apparent at the present time.

Conclusions

By 1820 there had developed a port linked by a number of major land routes and waterways to various outlying centres which were, for the most part, associated with rural settlement. The population was fairly evenly distributed between town and country; there were the beginnings of an external trade in primary produce, particularly wool; there were a few infant industries, mainly of the processing type; and the tide of free migration was just beginning to flow steadily. Though the total population was slight, all the major cultural elements of the time have remained to form a framework for the modern landscape. While it must be conceded that the present landscape would have been much the same had there been no convicts, there are a number of links with the past which should not pass without comment.

In road patterns particularly there is a correspondence between past and present (*Fig.* 4). There is nothing fortuitous or haphazard about the foundation of the arterial road system. Its beginnings were the result of a combination of various factors; cultivable land was scarce near Sydney, labour was cheap, and Macquarie had a passion for developing public works. The combination of all these produced a tentacular system of roads to which the modern roads are closely related. It is a very significant fact that the routes which the early surveyors marked out, and which the convict labourers cleared, provide three of the five major highways which run out of the county today.

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[7] Bigge: *op. cit.*, p. 43.

[8] Wentworth: *op. cit.*, pp. 17–27.

[9] Wentworth: *op. cit.*, p. 27.

Significance of the Towns

Next there are the towns, which are of less significance to modern Sydney than the roads. Parramatta and Liverpool, now suburbs, have maintained the relative importance in the county which they held 130 years ago. This is not the case with the Hawkesbury towns, whose potentialities were limited from the outset. They owed their importance to the surrounding fertile land, which was already intensively cultivated by 1820, so that the intervening years have seen remarkably little change. The Windsor muster for 1820 was 5506, of whom possibly 1000 were town dwellers; the 1947 total for the same area was less than 10,000. Thus the population of this important food-producing area has not doubled in the past 130 years. Dairy pastures, fields of fodder and vegetable patches have replaced the grain-dominant allotments; but the towns are much what they always were—flood-free residential areas giving service and protection to the surrounding districts.

A noteworthy feature of the early settlement pattern is its location in the centre and to the west of the county. Before 1820, there was practically no development in the future metropolitan inner suburban areas; to the east, north and south of Sydney the rugged and heavily-wooded surface of the sandstone uplands and the swamps of the depressions held little attraction. For this reason the greater part of metropolitan Sydney owes little or nothing to the first era of colonial development. At the very time when prospective settlers were being told that no more suitable land was available, some of the most valuable future sites remained untouched and unwanted. The story of these areas belongs to another period, one associated particularly with the expansion of commerce.

The structure represented by the towns and roads is augmented by the pattern of land grants, which emphasised the greater value of the central and western plain and the total inadequacy of the northern and southern plateaus. Here, much more than with the towns and roads, future trends were apparent by 1820. The river flats, the volcanic soils around Prospect, the friable soils of the Dundas area, and even the less-accessible pocket of sandy loams at Mona Vale, had been discovered and utilised by 1820. It is true that other suitable areas remained to be found and that continued and increasing demands were to bring less fertile areas into production. Yet, in spite of this, a stable pattern of cultivation was apparent by the time Macquarie left the colony. While there were a number of cultivated districts which have since been swallowed by the city—Ponds, for example, Field of Mars and Liberty Plains—these contained only a small proportion of the total settlers. Since the soils of the county are fundamentally poor, the few better parts have stood out from the beginning.

A less perceptible connection exists between the original property boundaries and modern boundaries and roads. It is evident from the parish maps that, in general terms, the alignment of roads, the shape and size of fields and even the layout of towns have been considerably influenced by property boundaries which existed before 1820. The same applies to local-government boundaries and to many of the district names which have survived from the earliest times.The stamp of the first generation is left in Sydney's framework of transport routes and settlement nuclei. The character of land utilisation and the structure of population have changed beyond recognition; but at least in rural land use the shadow of things to come could already be seen by 1820. The fundamental poverty still remains.

GEOGRAPHY IN SCHOOLS . . . .

4. *TEXTBOOKS: 1924-1953*

F. R. G. Aitken

A RECENT issue of the *New Zealand Geographer* contained an interesting note on some of the earliest geography textbooks used in New Zealand schools.[1] The contributor listed ten books published between 1856 and 1889, and commented on the paucity of information about the books used in schools during these earliest years of our history. This aspect of New Zealand education would be a profitable field for research—research which should be undertaken before all links with the past are lost through the passage of time. Readers may have in their possession, or they may have ready access to, some specimens of these early publications; a search of school bookrooms and storage cupboards should bring others to light. The editor has made the valuable suggestion that examples of these should be sent to the library of the New Zealand Geographical Society for safe keeping and for use by students of school geography. It is to be hoped that in time the Society's library will contain a complete textbook section which will provide a historical survey of this phase of geography in New Zealand.

The present article is a review of the changes that have taken place in geography textbooks during the last thirty years—the period during which the Education Department has exercised official control over the books used in schools under its jurisdiction. During the early 'twenties, it became apparent that the complete freedom hitherto enjoyed by schools to select their own textbooks had led to the use of an excessively wide range of books, many of them of mediocre standard and a number of them very costly publications. Complaints by parents of the high cost of many of these books (a feature of our education that is unfortunately still with us) and of the necessity of buying an almost completely new range of texts when their children shifted from one school to another added strength to the dissatisfaction expressed so often by the authorities at the chaotic state of affairs that had developed. The Minister of Education, Sir James Parr, directed that steps be taken to restore some semblance of order, and the following extract taken from the *Annual Report of the Inspectors of Secondary Schools* gazetted in 1924 records the action taken:

> By direction of the Hon. Minister, steps were taken early in the year to reduce the variety and number of textbooks used in the secondary schools of the Dominion. A sufficiently comprehensive list of approved textbooks was accordingly drawn up and gazetted in May; it is to become fully operative in 1925. In compiling the list it has been found advisable to retain for the present several mediocre but widely used books and on the other hand to exclude some excellent ones by reason of their high cost. Several old-fashioned and comparatively poor books have been banished, and at the same time those introduced by the more progressive teachers have not been neglected. The list, though meeting with

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[1] See C. R. Straubel: 'Early Textbooks of Geography in New Zealand', *N.Z. Geographer,* Vol. 8, No. 2, October 1952, pp. 179-181.

> considerable criticism on minor points, has on the whole been well received: it should ultimately not only reduce the expense to pupils moving from school to school, but also materially improve the quality of textbooks used in the schools.[2]

In making their selection, the compilers of the list were influenced 'by the cost of the books, by their suitability for the various grades and types of pupil, the very general use of certain books, and the various methods of teaching employed'.

The thirteen geography books which constituted the Approved List in 1924 were:[3]

*J	*Model Geographies Series*	Philip and Son
	Herbertson: *Preliminary Geography*	Oxford University Press
	Alford Smith: *Textbook of Commercial Geography*	Macmillan
	Pacific Geography, Book VI	Longmans
J.M	Shrimpton and Hight: *Junior Geography of New Zealand and Australia*	Whitcombe and Tombs
	Longmans Geography, Book II	Longmans
	Unstead and Taylor: *Essentials of World Geography*	Philip and Son
M	Herbertson, Howarth and Taylor: *The World and Australasia*	Oxford University Press
	Howarth: *Commercial Geography of the World*	Oxford University Press
	Wallis: *Junior Geography of the World*	Macmillan
	Fairgrieve and Young: *Human Geography for Secondary Schools*	Philip and Son
M.S	Marshall: *Geography of New Zealand*	Whitcombe and Tombs
M	Herbertson: *Senior Geography with Physiographical Introduction*	Oxford University Press

*J—Junior forms; M—Middle forms; S—Senior forms.

The most obvious, and by no means surprising, feature of this first approved list is that all the books have long since ceased to be used in schools. Indeed, it might not be easy to find copies of some of them without a search. Many of them were, in fact, nearing the end of their career even in 1924, and when the list was reissued in the following year, five of the texts (including two from the supplementary list) had already been dropped.[4] The titles of most of these books will be familiar to

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[2] The 1924 list was 'approved for use in secondary schools, the general course in technical schools and in secondary departments of district high schools'. The course distinction in technical schools disappeared with the introduction of the 'common core' in 1944, and the latest list applies to 'secondary schools, technical schools, combined schools, and secondary departments of district high schools'. With reference to the 1924 list it would be interesting to discover what were the titles of the 'old-fashioned' books banished by official edict.

[3] By an amendment published in the *Education Gazette* late in 1924, three further books were added to this first list.

J	Carey: *A First Book of Physical Geography*	Macmillan.
M	Barnard: *Outlines of Physical Geography*	Black.
	Mort: *A Regional Geography for Intermediate Classes*	Oliver & Boyd.

For some unknown reason the first two of these books did not appear again when the list was reissued the following year.

[4] The books dropped in 1925 were:

J	*Model Geographies Series.*
M	Howarth: *Commercial Geography of the World.*
M.S	Marshall: *Geography of New Zealand.*
J	Carey: *A First Book of Physical Geography.*
M	Barnard: *Outlines of Physical Geography.*

older readers, and comment on two or three of them will be sufficient to show trends in school geography at that time.

Two New Zealand publications were given official recognition, but of these, Marshall, an authoritative but rather advanced treatment of our own country, was dropped in future lists. Shrimpton and Hight's *Junior Geography of New Zealand and Australia* remained for many years the standard textbook on the subject for Forms III and IV, and it is probably the best example on the list of the teaching vehicle for the gradually disappearing 'capes and bays' geography. For a long time geography had been 'a description of the earth and its inhabitants', and the vast handbooks of geographical knowledge, of which so many existed, were condensed to form school textbooks. They were, in the main, gazetteers containing lists of towns, with population figures, products, rivers, mountains, capes and bays. In the adaptation from the original no effort was made to vary the style of writing to suit the younger readers; and this did not seem very important when the main concern of the teacher was to see that the facts in the book were memorised by the pupils.

A brief historical introduction in the Shrimpton and Hight book was followed by a physical section—forty-two pages of classified description of the main physical features of the country. The final section on New Zealand, consisting of 115 pages, was headed 'Industrial and Economic'. It opened with a discussion on the influence of physical features, climate and other natural resources upon the distribution of population and the occupations of the people. Then followed the usual summarised treatment of industries, products, transport and communications, towns and population. The 172 pages were tightly packed with facts and figures, relieved only by eighteen very crowded maps. There was an entire absence of photographs, illustrations, diagrams and exercises.

The Regional Approach

The 'gazetteer' type of textbook had in the earlier years of this century given way overseas to a new kind of book—a change made necessary by the new regional approach to geography. As early as 1905 Herbertson had put forward his 'natural regions' of the world. He divided the land surface of the globe into fifteen areas based on climate and resultant natural vegetation, and textbooks opened with a section setting out this generalised world pattern. The facts of climate and vegetation were then applied to the appropriate areas of each continent when it was discussed in later chapters.

There was little variety in the kind of treatment given to the different countries or continents. The early sections dealt invariably with the continent as a whole. Size, shape, relief, climate, vegetation, population, communications and economic characteristics were covered in that order. Then followed a treatment of individual regions—'natural regions'—on the same pattern. There was a strongly deterministic flavour about these books and pupils learned, for example, that the Canadian prairies produced wheat because the climate is continental and the land is flat.

Mention has already been made of the tendency to write in an adult style with no attempt to adapt the material to suit the age of the pupil. Herbertson was among the first to realise the need for a graded series of textbooks suitable for the different stages of pupil development. The approved list of 1924 contained three books by this author, one for each stage of the school course. The intermediate one was prepared in association with Howarth and Taylor particularly for schools in Australia and New Zealand.

A new vogue in geography teaching was typified in Fairgrieve and Young: *Human Geography for Secondary Schools,* a series that was to become very popular in schools in this country. These books were among the first to deal with the everyday activities of people. They were much more attractively produced than the earlier school-texts, with maps and illustrations liberally used to assist the text and to interest the pupil reader.

These examples from the first attempt to restrict the range of textbooks in use give a very clear picture of the changes that were taking place in geographic thought and, consequently, in the methods of teaching in secondary schools. The three books selected for special mention serve to show that changes were made but slowly in New Zealand, and this conservatism has persisted to the present time. The *Annual Report of the Chief Inspector of Secondary Schools* in 1926 made reference to this unwillingness of some teachers to move with the times:

> The list of approved textbooks continues to serve a useful purpose. In several instances, publishers have agreed to reduce the price of a book in order to secure its retention on the list, and publishing firms, both home and abroad, have displayed enterprise in revising old publications or in issuing new ones in an endeavour to have them retained or placed on the list.
>
> Several schools persist in using a few of the antiquated textbooks of the last century. This tendency is probably more marked in the large boys' schools than elsewhere—and a few adhere to expensive books which might well be replaced by others of equal worth and less cost.

The approved list continued to be issued as and when the occasion demanded, and five were gazetted between 1924 and 1935.[5] In this latter year the list contained only eight names in the geography section. They were:

J	Fairgrieve and Young: *Growth of Greater Britain*	Philip and Son
J.M	Insull: *A Modern Geography for Junior and Middle Forms*	Avery
	Jobberns and Britton: *Whitcombe's Intermediate Geography*	Whitcombe and Tombs
M	Fairgrieve and Young: *Human Geography for Secondary Schools,* Books II and III	Philip and Son
	Jobberns: *Whitcombe's Regional Geography of the World*	Whitcombe and Tombs
	Thurston: *Progressive Geography,* Book V: *The World*	Arnold
S	Brooks: *New Regional Geographies,* Book IV: *The World*	University of London Press
	Howarth and Bridewell: *Geography of the World*	Oxford University Press

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[5] During this period five textbooks had a short life on the approved list. They were:

J	Lay: *Commercial Geography*	Macmillan
J.M	Coad: *Geography of the Pacific*	New Zealand Book Depot
M	Mort: *Commercial Geography*	Oliver and Boyd
M	Wilmore: *Introduction to World Geography*	Bell
S	Wilmore: *Groundwork of Modern Geography*	Bell

The only survival from the original list is the Fairgrieve and Young series, and it is an interesting fact that these books have had the longest reign of any 'approved' textbook. Every list published between 1924 and 1944 contained one or more of the series.

Advent of New Zealand Publications

The most significant feature of the 1935 list is, however, the appearance of three New Zealand publications. Local authors had certainly been represented in earlier lists, but none had dominated geography teaching to the same extent as these new publications which continued in common use for the next ten to twelve years. Two were written for junior forms, whilst the third was specifically for the middle and upper classes. The texts did not mark any new approach to the subject; they were successful in almost completely replacing earlier books chiefly because they were written in this country to satisfy the requirements of the syllabuses of instruction and examination prescriptions then in existence.

Whitcombe's Regional Geography of the World can be taken as an example of these latest New Zealand publications. It opened with a short section dealing with some elementary principles of human geography, including a chapter on 'The Natural Regions of the World'. The second, and principal, section consisted of a descriptive geography of the countries of the world, continent by continent, each treated in the 'logical' manner described earlier in this article. Part III was entitled 'A Summary of Physical and Mathematical Geography', and contained short chapters on such subjects as 'The Earth as a Sphere', 'Mapping the Earth', 'The Surface of the Earth', 'The Sea' and 'The Atmosphere'. The book was well printed and produced, while copious maps, diagrams and photographs, 170 in all, made it much more attractive and interesting than most of the overseas publications it replaced.

These books continued in general use for over ten years, and the only additions to the approved list between 1935 and 1944 were mainly for the use of sixth forms. Two such books were Buchanan: *Economic Geography of the British Empire* (University of London Press) and Laborde: *The World in Outline* (Cambridge University Press) both of which were added in 1939, and it is only in the last three or four years that they have ceased to be in general use in senior classes.

New Syllabuses; New Prescriptions

The year 1945 marked the beginning of a new period in post-primary education in this country. The Minister of Education had in 1942 set up a Consultative Committee on the Post-Primary Curriculum. The report of this committee was published in November 1943, and its recommendations, with some modifications, were incorporated in the 1945 Education (Post-Primary Instruction) Regulations. At the same time were issued the new syllabuses of instruction for post-primary schools, and new prescriptions for the School Certificate examination. The geography prescription broke from the older systematic studies and specified the regional approach.

This new prescription was anticipated in the 1944 issue of the approved list—the last one to be published in the old form. Ten geography books were listed, four of them new:

J	Herdman: *Discovering Geography*, Books I to IV	Longmans
J.M	Various authors: *Geography for Today*, Books I to IV	Longmans
	Carter and Brentnall: *Man the World Over*, Vols. I to III	Blackwell
	James and Browne: *Modern World Geographies*, Grades 6, 7, 8	Specialty Press, Melbourne
	Kermack: *Our World Today*	Johnston
M.S	Jobberns: *Regional Geography of the World*	Whitcombe and Tombs
S	Brooks: *New Regional Geographies*, Book IV: *The World*	University of London Press
	Laborde: *The World in Outline*	Cambridge University Press
	Buchanan: *Economic Geography of the British Empire*	University of London Press
	Stamp: *Commercial Geography*	Longmans

In 1945, after the new regulations had been gazetted, the Education Department circulated to schools a cyclostyled paper entitled 'Selections from the Authorized Textbook List with Commentaries and Additions'. This was based on the printed list of 1944, and was a guide to teachers as to the most suitable books for the new requirements. There were three additions to the geography section:

J	E. Young (Ed.): *Kingsway Social Geographies*, Books I to V (This was intended for short-course pupils and for use in class-sets in lower third and fourth forms.)	Evans Bros.
J.M	Stembridge: *New Oxford Geographies*	Oxford University Press
S	Willis: *Systematic Geography*, Part I: *World Relations*	Philip and Son

Reference was made to the unsatisfactory nature of the geography books listed for senior classes, and schools were warned to exercise caution in ordering new books for sixth forms in view of expected changes in the prescription in geography for the University Entrance examination. The new prescription did, in fact, come into force in 1949 and in this prescription also greater emphasis was given to regional geography, although the wording still gave some prominence to systematic studies. To cover more adequately this new prescription, two further books have been added to the list by notice in the *Education Gazette*. They are:

Stembridge: *The World. A General Regional Geography*	Oxford University Press
Stamp and Suggate: *Geography for Today*, Book V: *The World*	Longmans

Other additions to the list of recommended books have been:

J.M	Fairgrieve and Young: *Real Geography*, Books I to V	Philip and Son
S	King: *The Pattern of Human Activities*	Australasian Publishing Co.

Ignoring completely the different approach to geography as typified in the latest textbooks, which is but a reflection of the existing concept of geography and may in the course of time show radical changes, there can be no doubt that the period under review has seen a tremendous advance in the standard of textbooks prepared for schools. The material is more carefully selected and much better graded for the different stages of the school course. There is much less geographical thinking by the author for the pupil, and an earnest attempt is made to present material in such a way that the pupil will be stimulated to think for himself. An increasing number of books tend to lead from a study of particular units to a more generalised treatment of the region of which the unit is typical. This method is well illustrated in the *Real Geography* of Fairgrieve and Young. This is an excellent series in which each chapter deals with the economic and human geography of a real place—a farm, a factory or a settlement. Plans, maps and photographs provide a vivid visual record of important aspects of the unit, and a set of questions leads to further study of the associated region. This method of treatment has much to commend it, particularly in the lower forms before the school certificate stage is reached.

Illustrations today are not just pretty pictures to add interest to the page. They are more often carefully selected to represent some essential feature of the region under review, and they are frequently accompanied by questions to stimulate pupil activity. In the same way, pupil exercises are framed not only to test material in the text, but also to lead to further study of map, atlas and other relevant material. Finally, most books are excellently produced and printed in good quality paper.

This brings the survey up to date. The present prescription for the School Certificate examination, which sets the pattern for teaching in schools, has now been in operation for eight years. A small committee, set up by the Director of Education, has recently made recommendations for certain changes in the prescription—chiefly aimed at a reduction in the range of regions to be covered in the examination. No change in approach to the subject is envisaged, and existing textbooks are expected to cover the revised prescription as adequately as they do the present one.

KAPITI: A FRAGMENT OF ORIGINAL NEW ZEALAND

FRANK SIMPSON

STRANGE things have happened on the little island standing off the Wellington west coast beaches of Paraparaumu and Waikanae; and equally dramatic is the transformation now reaching a climax on the peaks and in the gullies of this one-time Maori Gibraltar.

The story of Kapiti Island is a gruesome story, bearing the mark of neolithic cannibalism in its worst form. Nor were the Europeans altogether innocent observers. It was indeed upon a European ship, with the active assistance of the European master, that Te Rauparaha's men swooped down on unsuspecting Banks Peninsula to indulge an orgy of vengeful killing. And it was upon the same European ship that the triumphant Maoris returned to Kapiti with baskets of human flesh, and with royal captives spared for a slow death.

Could they speak, the shores of Kapiti would tell of many bitter fights for possession of this strategic point along the canoe-highway from the North Island to the South Island. They would speak, too, of lawless whalers and traders, of piracy and murder, and of head-hunters clothed in the guise of flax-traders from various parts of the Pacific.

A Land Despoiled

These human conflicts, confined as they were mainly to the shore, made little impression on the rich inland bush and its birdlife; until, as on so many parts of the mainland, the attack came upon the forest itself. In a few short years an ugly scar spread from one end of the island to the other, a scar of blackened ancient trees, of seared ferns, of vanished birds, and of mutilated beauty. Tussock and gorse and manuka spread where the trees and ferns died. The bleat of wild goats replaced the song of the tui and the bellbird. Cattle, sheltering in the valleys and creek-beds, stifled any incipient rebirth of the native forest. Opossums multiplied in the few remaining stands of bush. It was an island in transition from Nature to civilised farming.

When at length the conscience of New Zealand was awakened to the need to preserve some parts of the country in a more or less natural state, Kapiti was among those portions chosen to be set aside for regeneration. But it was one thing to declare a principle; quite another thing to give Nature a fair chance in the battle for new life. Many years elapsed before the authorities recognised that if Kapiti were to be a true sanctuary of recovered nature, money must be spent clearing the land of destructive scrub and animals. Citizens, in Wellington and elsewhere, lent their moral and practical support to this work. But it was a slow process. Nor was it until about a quarter of a century ago that, with pests to a large extent removed, the island really started back towards its pre-European character.

REGENERATION

It is by no means premature to suggest that this experiment is proving a success. Already at Kapiti Island there has been reconstructed what may be regarded as a piece of original New Zealand. The bush is slowly extending to cover the few portions of the island that still bear a cloak of tussock and grass. The forest is once again alive with birds, and New Zealanders can enjoy the famous dawn song of the forest that charmed the early explorers.

Already, before he reaches the island—after a somewhat adventurous surf-wading embarkation at mainland Paraparaumu—the visitor is aware of the primordial nature of the island's recovered environment. A brood of paradise ducks swims unconcernedly a few yards from the launch. Along the shore, on both sides of the landing place, are flocks of nesting black-backed and red-billed gulls. As the launch engine stops for the final run in, the song of land birds floats down from the bush. Within a few feet of the landing, in a clump of raupo reeds, a pukeko casts an inquisitive eye, and hurries away to protect its young.

All the way up the bush path to the visitors' quarters, the trees and undergrowth bespeak sound and movement. When evening comes the sounds and movement grow, and new sounds emerge. Kiwis—both the North Island and the South Island species—begin their raucous calls, awakening the sensitive sleeper. Towards dawn the bush comes to life in all its startling chorus of native vitality. The sounds are too many, and too confused, for any but an experienced observer to disentangle and identify one by one.

As the sun strikes the eastern face of the island, the soft green curtain of foliage is broken by white patches that denote fat pigeons preening themselves on tree tops. There was a time when farmers waged war on the pigeon, not only because he made an excellent lunchtable pie, but because he was deemed destructive to plants and seeds. So great was the slaughter of the pigeons that they were threatened with extinction. Now, unmolested at Kapiti, they are breeding in concentrated hundreds. Along the ground, at almost every turn of the path, run cheeky wekas, ready to pounce on any shiny object that is put down for their examination. The weka, too, faced extinction, for it was an easy victim for dogs and other such introduced animals. Kapiti has proved a sympathetic home and regenerative centre for this native ground bird.

Bush and Birdlife

No New Zealand bush would be complete without bellbirds, tuis, silver-eyes and fantails; nor is the Kapiti bush any exception. Tuis cluster three and four together on the stalks of flax bushes, and bellbirds sip sweetened water from a bowl in the caretaker's garden. The native robin is more elusive, but an excursion into the more secluded parts of the island shows that he is by no means uncommon. The yellowhead, or bush canary, is occasionally seen, and his chattering is heard with much more frequency.

Red-fronted and yellow-fronted parakeets—both once decimated because they were supposed to be a menace to agriculture—are to be found also, and there is evidence that they are both increasing in numbers. The friendly kaka, no longer fearing the wrath of the white farmer and his attendants, stays close to human habitation, and some, answering individual names, come out of the trees to eat dates and other delicacies held at the end of a long stick. Further afield, on the 1700-foot summit, the sooty shearwater burrows on the edge of a sheer drop, facing the entrance to Queen Charlotte Sound. This part of the island offers a view that is probably unsurpassed for extent and grandeur anywhere in New Zealand—more than a full half-circle of seascape and landscape, covering the Marlborough Sounds, Mount Egmont, Mount Ruapehu and the Tararua Ranges.

A launch trip to the northern end of the island reveals long open beaches of sand and boulders, a happy environment for gulls' nests, while in the lagoon at the northern spit are dignified stilts. The southern end of the island, by contrast, presents a scene of increasing ruggedness, until finally it pushes great cliffs out into the teeth of the Cook Strait southerlies. Along this coast are yet more gulls, and occasionally a gannet in flight, or a white-fronted tern, a reef heron, or a black shag.

It is along the southeast coast that the Kapiti bush is seen to perhaps its best advantage. Steep valleys rise straight up from the water's edge, and within those valleys the prevailing dark grey-green is broken by the red splash of pohutukawa, or, further inland, of rata.

Easy it may be to criticise a former generation for permitting so much destruction of native bush and its associated birdlife in many parts of New Zealand, but on the credit side there is the foresight that has enabled Kapiti and its fellow sanctuaries and reservations to go back towards their pre-European state. At the present rate of progress, it should be only a matter of a few years before the whole of Kapiti is once again covered in native bush, and the last opossum and rat exterminated. Then, in truth, there may be at Kapiti an unmarred fragment of the New Zealand that once was.

During the experimental stage it has, of course, been necessary to restrict the admission of visitors to the island. Such restrictions cannot, unfortunately, be discontinued; unfortunately because every New Zealander should have the opportunity of seeing the unique sanctuary. But the many must be penalised for the possible failings of the few. It has taken a quarter of a century for Nature, with human aid, to make Kapiti what it is; one human error, such as the careless dropping of a lighted match, could destroy this achievement in a few hours. Hence the necessity of keeping the island closed except for those with special permission.

Yet, so great is the interest shown in the island in recent years that some easing of restrictions—without any lessening of care—may shortly be called for. At present, the facilities for reaching the island are primitive, and these can be used only when the weather is not rough. Such difficulties could be overcome by the provision of suitable landing amenities at the island and at the mainland embarkation point. Until this is done Kapiti will be able only partly to fulfil its function as one of New Zealand's unique 'natural museums'— a museum in which the visitor can study in the course of one day, within thirty miles of the capital city, a greater variety of native bird life than he would in all probability meet in a week of rugged travel to remote parts of the dominion. The phase of building the reservation is passing, and the new phase of utilising the finished product, for the edification of New Zealand people and visitors from abroad, is now opening.

PHOTOGEOGRAPHY

A PICTORIAL SURVEY OF NEW ZEALAND

11. KAPITI: OFFSHORE ISLAND SANCTUAR

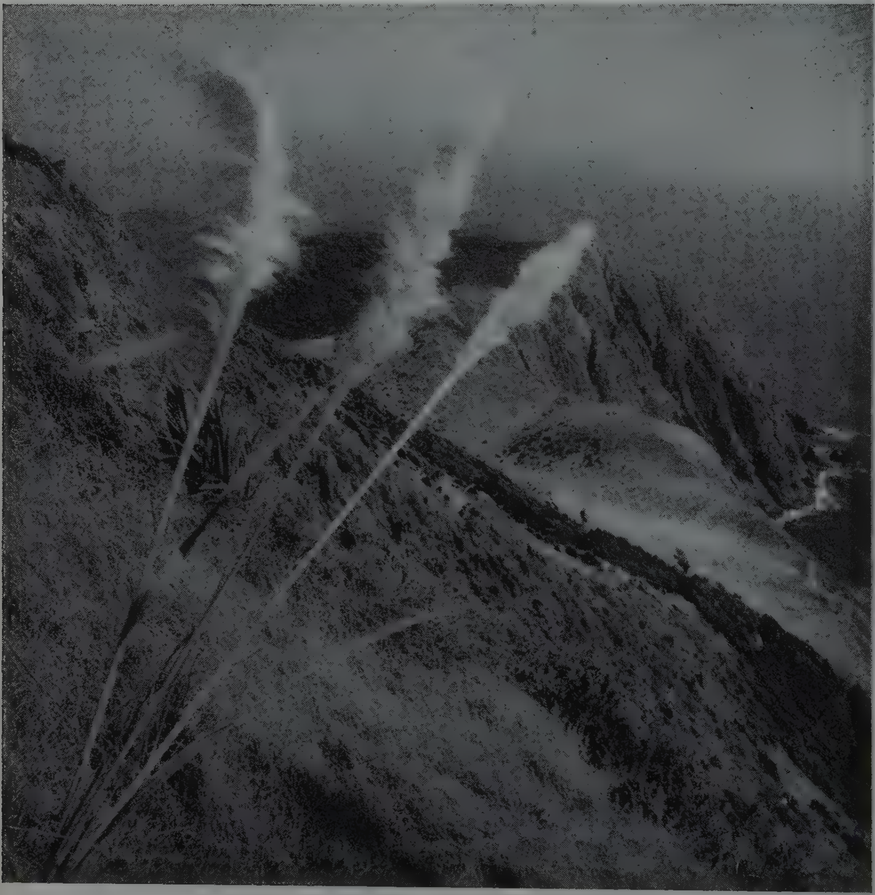


Fig. 1. *To the southwest Kapiti looks out over Cook Strait to the South Island.*

Photos: National Publicit

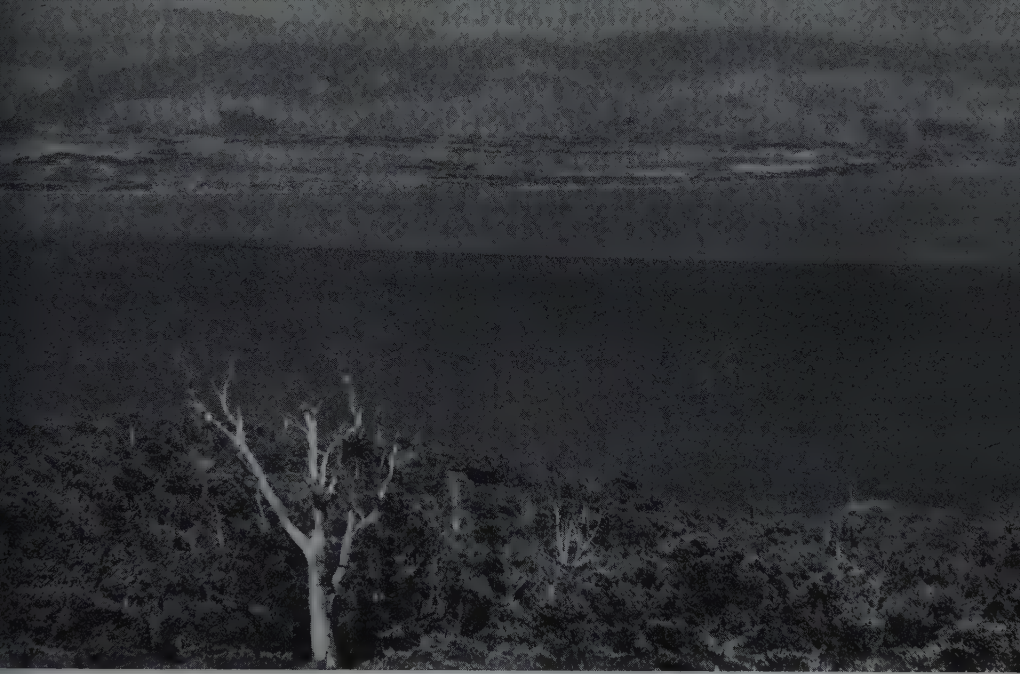
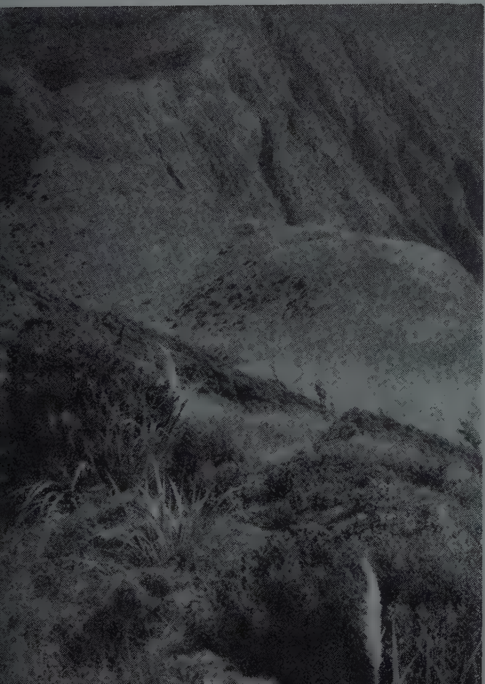


Fig. 2. *To the east a narrow seaway cuts it off from the North Island mainland at Paraparaumu.*

THE ISLAND AND ITS PLANT COVER

Fig. 3. *Rugged and elevated, Kapiti as been stripped of its original vege-ation but regeneration is now vigorous.*

Fig. 4. *Second growth native forest is evidence enough of the ability of the native vegetation to regenerate.*



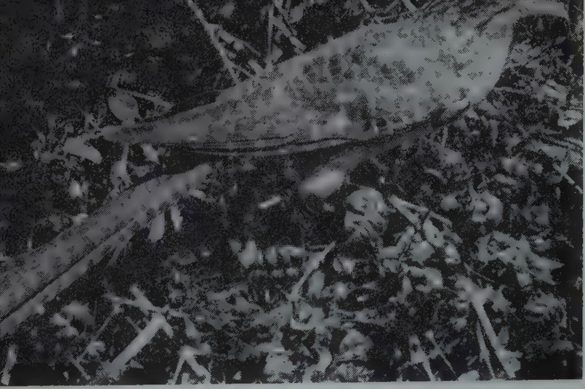


Fig. 5.
Long-tailed cuckoo

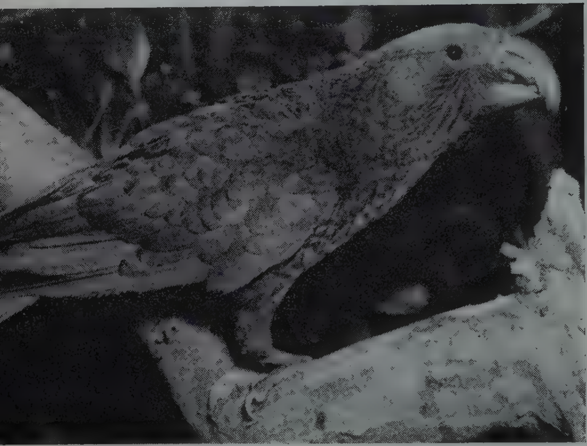


Fig. 6.
Kaka

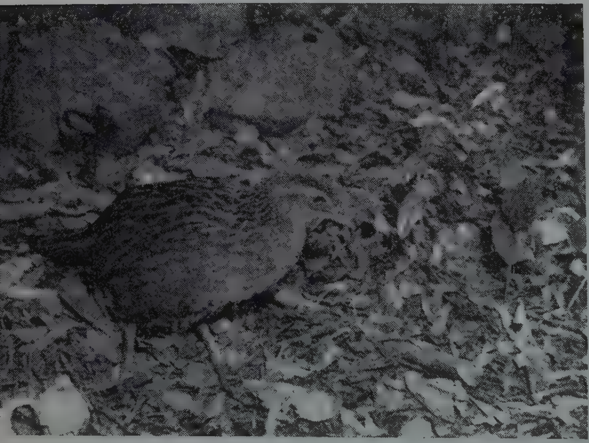


Fig. 7.
Weka

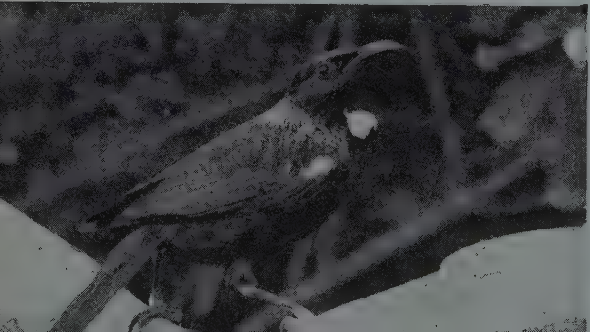


Fig. 8.
Tui

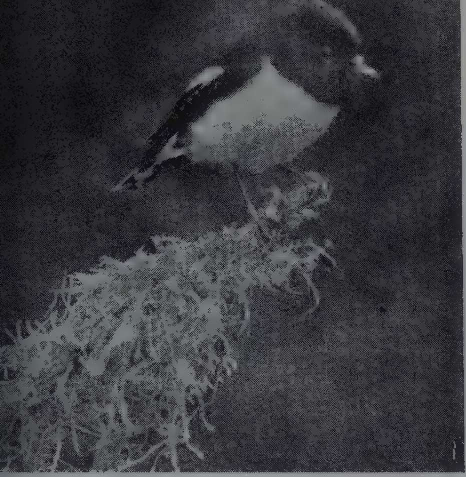


Fig. 9. *Tomtit*

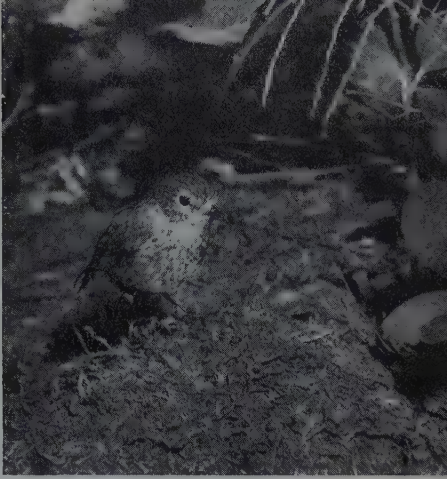
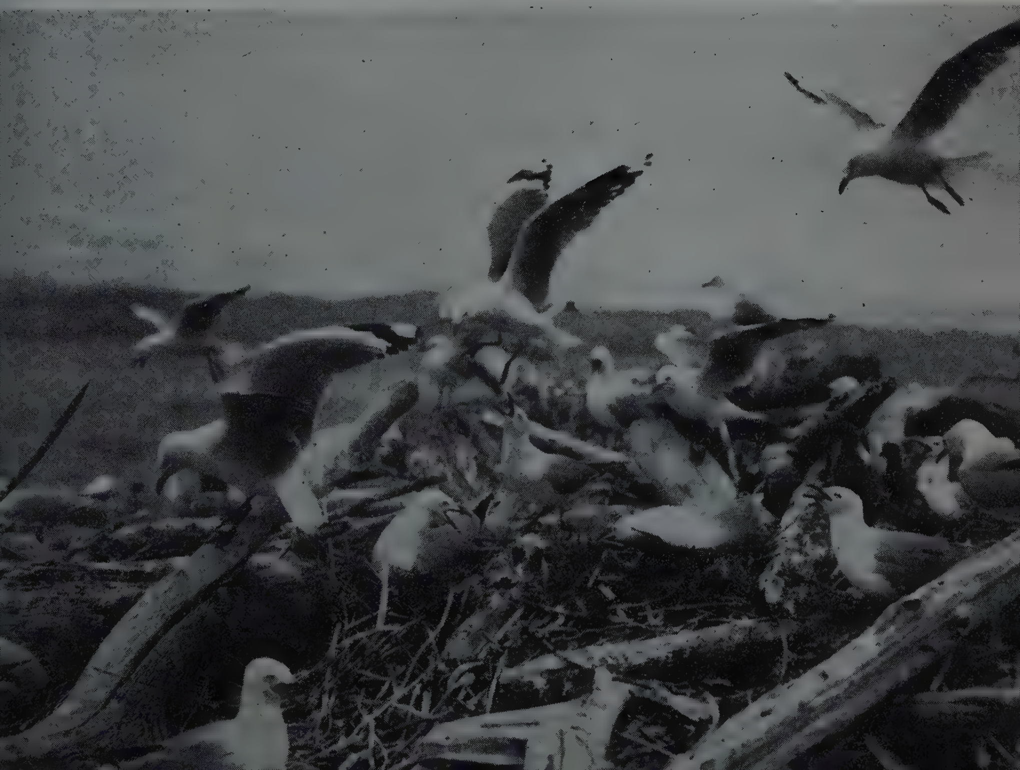


Fig. 10. *Native robin*

THE BIRDLIFE OF KAPITI

Fig. 11. *Seagulls on the coast.*



GEOGRAPHIC NOTEBOOK

CONTRIBUTORS TO THIS ISSUE. It is not long since the Vice-Chancellor of the University of Melbourne felt impelled to complain how 'despite their relative proximity to each other and their similar origins, tradition and culture, the Dominion of New Zealand and the Commonwealth of Australia have their backs turned on each other'. (See *N.Z. Geographer,* Vol. 3, No. 1, April 1947, pp. 92-93.) The *New Zealand Geographer* now finds itself able in a small way to rectify the unfortunate circumstances of which Sir John Medley complained. It is with pleasure that the journal publishes two articles by New Zealanders resident in Australia on the geography of our Pacific neighbour.

Both Mr. K. W. Robinson and Mr. A. D. Tweedie have previously contributed to the *New Zealand Geographer* statements on the geography of this country. On this occasion Mr. Robinson presents a study in historical geography, a part of the research he has undertaken during the past six years as Lecturer in Geography at the University of Sydney. Mr. Tweedie, Lecturer in Geography at the University of Queensland, Brisbane, contributes a further study in land use and its associated problems, being concerned in the present article with the cane-sugar industry of his adopted state. These two articles augur well for the future of geographical study in Australia and serve to emphasise the community of interest that does exist between the two dominions of the southwest Pacific—a community of interest that the New Zealand Geographical Society will endeavour to foster.

Twelve months ago the publication of a substantive article by Mr. F. H. Bishop was promised. His previous contribution to *Photogeography* briefly set out a theme which is now pursued in full to rank as a significant contribution to the geography of transport in New Zealand. Mr. Bishop, formerly geography master at the Sacred Heart College, Auckland, is now in charge of the Marist College at Suva, Fiji.

Mr. Frank Simpson of the *Evening Post,* Wellington, makes a welcome first appearance in the pages of the *New Zealand Geographer.* His interests are manifold and have been demonstrated lately in his editorship of the New Zealand Antarctic Society's publication *The Antarctic Today.* (See *Reviews* below.) Nevertheless he has always evinced a predilection for studies of the wildlife and natural vegetation of the dominion, and has been a protagonist in campaigns for their conservation. His present note on Kapiti Island is timely, for this erstwhile Maori fortress has now become a sanctuary.

In the series *Geography in Schools* Mr. F. R. G. Aitken, a Senior Inspector in the Education Department at Wellington, develops a topic first introduced in *Notebook* in October 1951. Textbooks to a large degree reflect prevailing philosophies and pedagogic interests, and the 'approved list' of the Education Department during the last thirty years provides no exception. Mr. Aitken's association with teaching in post-primary schools extends over many years and renders him particularly well-equipped to comment on the developments he outlines.

Further notes and reviews in this number have been contributed by: Professor H. R. Rodwell of Auckland University College; Mr. Murray McCaskill of Canterbury University College; Miss Eileen L. Elliott and Mr. R. G. Dick of the University of

Otago; Mr. W. P. Packard of University College, London; Professor Griffith Taylor of Sydney; Mr. Alan Mulgan of Wellington; Mr. David McLeod of Cass; Mr. John Cornwell of the *New Zealand Herald;* Mr. J. L. Hewland of Christchurch Boys' High School; Mr. R. G. Wilson of Timaru Boys' High School; Mr. I. D. Leggat of Rangiora High School; and the editors.

ON THE CREST OF THE WORLD. On 29 May 1953 one of Nature's last strongholds yielded to the efforts of Man. That day the New Zealander, Edmund Hillary, and his Sherpa companion, Tensing, stood on the summit of Everest, exulting in a personal triumph that owed everything to teamwork, hard training and supreme mountaineering skill. Everest had been conquered at last. Yet to its conquest contributed a wealth of experience which had accrued from many previous expeditions.

The Everest adventure has always been very much a British affair. Younghusband, Longstaff, Mallory, Ruttledge, Tilman and Shipton became household words in this mountainous frontier land—but always the approach from the Tibetan side failed. Finally the southern approach through Nepal was reconnoitred by a British team. New Zealanders are proud to think that they, too, have played their part both in the preliminary work and in the final triumph.

Himalayan mountaineering demands a long apprenticeship on many types of mountains, and no better training ground exists than that of the Southern Alps. Despite their comparatively low height, they pose problems in snowcraft and icemanship not met elsewhere—exposed arêtes, heavy snowfall, friable rock, and long and difficult glaciers. To these must be added the difficulties engendered by heavy packs in the notoriously bad weather of the nor'westers. Only the problems peculiar to exceptionally high altitudes are missing. Years of climbing in these conditions developed the technical perfection so ably demonstrated by Hillary on Everest.

But Hillary is not alone among New Zealanders who can claim close acquaintanceship with the Himalayas. A New Zealander by adoption rather than by birth, N. E. Odell was with the famous 1924 expedition which climbed to Camp VI, and it was he who saw Mallory and Irvine 'going strong for the top'. Twelve years later he joined the British-American expedition to Nanda Devi and stood with Tilman on the summit of that peak. In 1938 Odell again ventured into the Himalayas, this time with Tilman's Everest expedition.

Three years previously Shipton had led his expedition to Tibet to investigate monsoon conditions on Everest, to explore new routes, and to make a complete photogrammetric survey of the area. On that occasion L. V. Bryant was invited to take part. With Shipton he explored the West Rongbuck glacier, and with Tilman he reconnoitred the country to the southeast of Everest overlooking Makalu. In addition twenty-six peaks, each over 20,000 feet in height, were climbed. The eve of the second World War saw another expedition—to the Karakorams—in which Scott-Russell played his part as mountaineer, explorer and botanist. After the war Tilman returned to the Himalayas and with him went W. P. Packard, Rhodes Scholar and the first New Zealand-trained geographer to penetrate into this fascinating country.

Meanwhile the lure of high mountains was attracting the attention of men who had spent their lives climbing among New Zealand mountains. Riddiford, Hillary, Lowe and Cotter, seeking all the advice they could get, raising money as best they could, and with splendid assistance from the Himalayan Club, set off from the dominion to climb Mukut Parbat, to explore new country, and above all to gain experience. All this they achieved. Shortly afterwards Riddiford and Hillary, at short notice, joined Shipton on a new reconnaissance of the western approach to Everest. Their work helped to lay the foundations for the Swiss attempt to climb the mountain in 1952 and for the successful conclusion to this latest British expedition led by Colonel Hunt. Meanwhile Hillary and Lowe had taken part in an expedition to Cho-oyu, and four other New Zealanders, Gardner, Roberts, McCallum and Bishop had reached Nepal and were engaged on exploratory and botanical work.

The work of Hillary and Lowe during this last assault on Everest is now well known. Yet as they struggled upwards to find a site for Camp VIII they must have recalled how their experience together in the Southern Alps had helped to prepare them for this final onslaught. To Sir Edmund Hillary goes the honour of success, but his prowess is the prowess of a team, and both Hillary and Lowe, together with their companions, have set an example to all mountaineers in New Zealand of grit and fortitude, and of unselfish devotion to a task ahead.

A BIBLIOGRAPHY OF NEW ZEALAND MAPS. Early in 1952 the New Zealand Geographical Society received a request from the Map Division of the Library of Congress, Washington, for an exchange of map bibliographies. A complete bibliography of New Zealand maps does not exist. The Department of Lands and Survey has published a catalogue, but this only includes maps which may be purchased from that department. Consequently, from time to time, the need for a national bibliography has been emphasised by research scholars who have discovered many valuable maps during the course of their work. In May 1952 the subject was discussed at a meeting of the Council of the New Zealand Geographical Society, and it was suggested that the Canterbury Branch should establish a committee to examine the prospects of compiling such a bibliography. The following is a brief résumé of the methods employed by this committee, its aims, and progress to date.

A number of standardised forms were cyclostyled for the purpose of collecting the relevant map data: the title or area covered, date, scale, surveyor, size, number of copies available, the location of the map and its local reference classification. Any special features not recorded under the preceding headings were allocated space under the general title of description and remarks. The committee is restricting its activities to the northern portion of the South Island and aims to list all maps found in the offices of the Department of Lands and Survey, in the offices of local bodies, and in museums and libraries, excepting only those maps which appear in the official *Catalogue of New Zealand Maps*.

A real treasure house of material for the historical geography of the West Coast was found in the map collections of the offices of the Department of Lands and Survey in Hokitika and Nelson. These included a map of all buildings in the commercial area of Hokitika in 1867, a time when the town ranked fifth among the urban areas of New Zealand. More than a score of the smaller mining townships of Westland were surveyed between 1869 and 1885. Today many of these are mere ghost towns, lost among scrub, second-growth forest or mine tailings. Early maps showing their street patterns and distribution of buildings provide valuable material for the study of mining settlements at the height of their prosperity and, in a few cases, show changes in the form of the township in the thirty or forty years between successive surveys. Smaller-scale manuscript maps of the West Coast as a whole or of its larger parts show many topographical features of the gold-rush era which have subsequently disappeared from the landscape: patterns of water races, dams, old mining claims, tramways, tracks, roads and river-mouth ferries, stores and diggings, townships, old sawmills and flaxmills, and former bush boundaries.

From the map library of the Department of Lands and Survey in Christchurch, information from one hundred and thirty maps has been recorded. These range from maps showing preemptive rights; maps illustrating grid-ironing, a subtle method employed by the early settlers in Canterbury of obtaining the use of large tracts of land; early maps of Christchurch indicating the functions and extent of buildings in the central core of the city in 1862 and 1877; and maps showing the location of Maori pas, gardens, fishing grounds and tracks in the vicinity of Christchurch in 1848-1849.

The committee has made a beginning, but much remains to be done. In Wellington especially, an examination of the map resources of several libraries and government departments should reveal much of value. A most fascinating map of the scene of New Zealand's first goldfield at Coromandel was noted in a cursory inspection of the map safe of the Department of Lands and Survey. This map, compiled by Charles Heaphy shortly after the first gold rush in 1852, shows the distribution of native, freehold and Crown lands, the sites of Maori pas and European houses, the forest edge and trackways, the location of the gold diggings and the site of four townships, surveyed, but never built on, at a time when it seemed likely that the shores of Coromandel Harbour might rival those of the Waitemata in population and economic importance.

The Canterbury Branch has made a promising start in searching out and classifying the map resources in the northern part of the South Island. The work should be completed in 1954 and a preliminary list published at least in cyclostyled form at an early date. It has been shown that maps of inestimable value do exist, although they are scattered and their contents are unknown to all but a few officers of the government and of local bodies. One hopes that other branches of the New Zealand Geographical Society may be encouraged to follow the Canterbury Branch and undertake similar surveys of the map collections in other parts of New Zealand. The compilation of a national bibliography of maps within the next five years should not be an impossible goal for a large active society. It is an essential preliminary to sound and detailed studies in historical and regional geography. It should prove useful not only to geographers but also to historians, geologists, ecologists, administrators, and to the public in general.

AUCKLAND'S AGRICULTURAL FRONTIER. In the field of land development, the operations of the Department of Lands and Survey are cutting an ever-widening swathe across New Zealand's idle acres, as is shown in the *Annual Report on Settlement of Crown Lands* for each year since 1947. The department is at present working to a programme which provides for the 'grassing-down' annually of approximately 40,000 acres, the bulk of which is in the Auckland Province. The total assets in blocks under development amount to more than £15,000,000, of which more than £13,500,000 represent land and improvements. Land development in New Zealand is therefore big business. The areas actually under development in the Auckland Province on 1 April 1953 totalled approximately 573,595 acres. This area is estimated to provide for settlement 988 dairy farms, 557 sheep farms and thirty-nine mixed farms, with an additional 300 farms whose ultimate use has not yet been specified.

In Northland twenty-eight blocks with a total area of 81,124 acres are being developed for settlement, and it is expected that forty-seven dairy units, twenty-four sheep units and one mixed unit, accounting for 17,180 acres, will be offered for ballot during 1953-1954. Apart from its present schemes in Northland, the department recently conducted a land utilisation survey in the nine counties north of Auckland. The provisional findings showed that there were 228,000 acres of unused land which warranted further and more intensive investigation to determine more accurately their potential worth. The survey indicated that the stock capacity of the area in dairy cows and breeding ewes could be nearly trebled if Northland's farmable lands were turned into first-quality pasture. On the other hand, as a result of the survey, more than one million acres in the area were classed as unsuitable for farming. About half of this total is under forest and 157,000 acres are covered by sand dunes. The area selected for further investigation represents only ten percent of the total farmable land in the area.

Considerable development is also taking place in the southern part of the province, particularly in the King Country near Te Kuiti, where 83,880 acres are being brought into production. The provisional settlement programme in this area during the next two years is for the settlement of 11,394 acres comprising thirty-three dairy units and fifteen sheep units.

Public interest in land development, however, is centred on the farming possibilities of the Volcanic Plateau in the Rotorua-Taupo district, particularly as the farming potential here is closely linked with other important developments, such as the chain of hydroelectric power stations along the Waikato River, and the plan to utilise the vast exotic plantations in the area for timber and paper-pulp production. This area undoubtedly offers the greatest scope for land development. It is bounded generally on the east by the Rangitaiki River (but includes the Galatea Basin and the adjacent low-lying areas), on the north by the Rangitaiki Plains, on the west by the Mamaku and Hauhungaroa Ranges, and on the south by Lake Taupo—an area of approximately 2750 square miles or 1.75 million acres. Here, still only partially developed, are approximately 500,000 acres of Crown, Maori and freehold land capable of development for intensive dairy and sheep farming.

In the Rotorua-Taupo district at present development is proceeding on 392,875 acres which are estimated to provide 618 dairy units, 367 sheep units and thirty-six mixed units for settlement. The estimated carrying capacities are between sixty and seventy-five cows per dairy unit and between 1000 and 1300 sheep and supplementary cattle per sheep unit, these figures being taken as the full potential of the farms after some years of settlement. Approximately 100,000 acres of Crown land in the Rotorua-Taupo district have yet to be investigated for possible future development.

There is a widely-held belief that there are millions of acres of Crown land available for development in New Zealand, and in the Auckland Province in particular. The area of farmable Crown land remaining unselected is not unlimited, and the scope for development must necessarily narrow as time goes on. Figures revealed by land utilisation surveys serve to confirm the fact that the possibilities for settlement on Crown lands are diminishing. When they are exhausted the time will have arrived for a more critical stocktaking of New Zealand's settlement potentialities in the considerable areas of farmable freehold land at present lying idle or underused.

—John Cornwell

SCIENCE CONGRESS REPORT. Previously comment has been made on the papers presented in the Geographical Sciences Section at the Seventh New Zealand Science Congress (*N.Z. Geographer,* Vol. 7, No. 2, October 1951, pp. 171-173). Now the *Report* of this congress has been published by the Royal Society of New Zealand, and it becomes possible to review the work of the various sections, particularly from a geographer's point of view. However, only a limited number of papers have been published in full; others appear in abstract or by title, although several of more specialised interest have appeared elsewhere in other scientific publications.

Geographers will note particularly the paper in the Zoological Sciences Section given by G. A. Knox and entitled 'Oceanographic Research in New Zealand'. There has been a marked revival of interest in oceanographic problems in the New Zealand area and this paper provides a valuable summary of the results of active research carried out since 1949, describes the work in progress, and reviews projected research. The author emphasises the need for fisheries research, a field in which New Zealand lags far behind most other countries.

The geological history of the last 10,000 to 20,000 years is of import to workers in several fields of science. The elements of New Zealand's physical geography are young, and there has been considerable change in vegetation, climate and soil characteristics since the Pleistocene glaciation. C. A. Fleming, in 'Materials for a Recent Geochronology of New Zealand', assesses the methods of establishing a history of this Recent period by studying the succession of marine and land sediments, ash showers, soils, glacial features, and plant and animal remains, and by tree ring and carbon analyses. For New Zealand there is a special problem in determining a precise geochronology in that written history is but 200 years old and archaeological history only a thousand.

Those concerned with problems of the fuller development of the resources of the Canterbury Plains will find special interest in Mr. Collins' contribution, 'Ground Water in the Hydrologic Cycle, with Special Reference to Canterbury'. The paper includes a discussion of the practical aspects of ground water in water supply, drainage, irrigation and land use, and concludes with a most useful bibliography of studies of ground water in New Zealand. A topical note is introduced in the address given by C. W. O. Turner to the Technological Sciences Section: 'A Broad Survey of New Zealand Power Resources'. A review of the physical factors that are essential in the economic development of a new power site is followed by a regional survey of potentialities for power development in this country.

The application of science to farming practice in New Zealand is one of the principal reasons for the high productivity of the dominion's agricultural industry. Some of the historical aspects of this theme are developed in papers by L. J. Wild on 'Science and Primary Production in New Zealand 1850-1900' and W. M. Hamilton on 'The Influence of Science and Technology on Farming Development in New Zealand'. Dr. Hamilton's concluding statement is particularly appropriate and should be emphasised: 'The average carrying capacity of New Zealand grasslands has more than doubled in the last fifty years, and productivity per unit of stock has also increased markedly. While this increase cannot be claimed as due entirely to research, such an increase would have been impossible without the aid of science. With techniques now known there appears no reason why production should not again be doubled in the next ten to twenty years.'—MURRAY MCCASKILL

NEW ZEALAND TRADE: THE FINANCIAL ASPECT. The *Annual Report* of the Department of Industries and Commerce for the year ended 31 March 1952 opens with a brief review of the nature of and reasons for the balance of payments difficulties of the sterling area, and with an explanation of the advantages New Zealand enjoys as a member of that area and of the responsibilities which membership imposes upon her. The report then proceeds to review New Zealand's own trading and industrial position and outlook. Brief reference is also made to such topics as price control, the Wheat Committee's work, the Tobacco Board, the Library and Information Services, and to exhibitions and fairs.

The report points out that one of the important reasons for the steady pressure upon New Zealand's overseas funds is the adverse 'terms of trade' position which has prevailed since the beginning of the war. Only in 1950 and 1951 did the terms of trade move in favour of New Zealand and then only because of the high level reached by wool prices. Even today wool prices are relatively much higher than meat and dairy prices and it is the price of wool that has prevented the terms of trade from moving further against New Zealand than has been the case up to now. There can be little doubt that the bulk-purchase agreements governing the sale of New Zealand exports of meat and dairy produce have operated to prevent the prices of these commodities rising as fast as import prices, and New Zealand must consider very carefully whether this system can be allowed to continue. Import prices were over three times their prewar level, but though wool prices were nearly three times their prewar level, meat prices had risen by the first quarter of 1952 only two and a quarter times and dairy produce prices only two and a half times. Whether or not this disparity between import and export prices would be adjusted by a return to free marketing conditions for meat and dairy produce cannot of course be decided definitely in advance, but the case of wool suggests that meat and dairy produce prices would rise nearer to the import prices level.

It may be that even if such a rise were to take place, New Zealand might continue to suffer from an adverse terms of trade position. In order to maintain her volume of imports, it would be necessary to expand her volume of exports. It is of paramount importance, therefore, to expand production of the pastoral industries, the products of which comprise some ninety-five percent of New Zealand's exports.

The pressure on overseas funds has serious implications for New Zealand. It has led to a return to exchange control and to some increase in import licensing in an endeavour to live within the country's income. But this income must be larger if, as the report points out, we are to maintain our real living standards *and* make good the deficiency in capital equipment which has persisted since the depression years of the early 1930's.

New Zealand is a developing country and therefore needs not merely to maintain existing capital equipment but to expand it. This she has been trying to do (as well as to repay overseas debt) out of current income, and this has made heavy demands upon overseas funds built up from export sales. Traditionally New Zealand has borrowed abroad for this purpose, but the report points out that 'for various reasons this is not quite so feasible at the present time'. One of the reasons is that New Zealand has not become a member of the International Monetary Fund and of the International Bank for Reconstruction and Development. Loans from this bank could not be expected to solve all New Zealand's problems, but such aid would be invaluable in developing the export industries. Since New Zealand cannot, or will not, borrow abroad she must provide for capital development from her current income, as the report is careful to point out, and this raises the important question of how the government can induce the individual to save sufficient for both private and public capital development. High rates of taxation reduce the individual's capacity to save, while low interest rates reduce the incentive to do so.

—H. R. Rodwell

NEW TOPOGRAPHIC MAPS. Since a previous note was published of new topographic maps published in New Zealand (*N.Z Geographer,* Vol. 8, No. 1, April 1952, p. 76) four have been received by the library of the New Zealand Geographical Society. Two are new issues in the series N.Z.M.S.1 on the scale of 1 : 63,360, and two are on the scale of 1 : 25,000. Of the latter, the Wellington Sheet (N.164/2) forms part of the systematic series N.Z.M.S.2 and presents a remarkably clear picture of the site of the capital city. The concentration in the administrative and commercial core, the dispersal of the residential areas, and the problems of accessibility are well demonstrated. Rugged terrain is the keynote, heightened by the winding of the roads and of the railway to Johnsonville. But in one respect the map is anticipatory—the railway to the Hutt Valley is not yet electrified, though work is now almost completed. This poses a nice problem in cartographic ethics. Should not the map depict the landscape at the date of draughting, 1 August 1952?

The Okotinga Sheet of series N.Z.M.S.2B—covering the Waiouru military training area—embraces parts of sheets N.122/7 and N.132/1 of the systematic series. The picture presented here is that of a section of the Volcanic Plateau with its natural scrub and tussock cover, its swampy tracts and relics of native bush, and the straight roads and railway crossing the area from Ohakune to Waiouru—an empty country where the man-made pine forests of the New Zealand Forest Service are all the more remarkable by contrast.

The two one-inch sheets, Rotorua (N.76) and Jollies (S.47) are both incomplete in that existing survey records have, of necessity, been called upon to fill in certain detail in more inaccessible country. Consequently the higher land of the Mamaku Hills on the one hand and of the Spencer Mountains on the other is inadequately mapped. Contours end at the limits of plane-table survey or have been sketched in. Nevertheless the Rotorua Sheet is an admirable representation of a part of New Zealand that is well known for its tourist attractions, whilst the Jollies Sheet is full of interest, depicting as it does the High Country of the South Island with its ranges, broad rivers, homesteads, huts and tracks.

These four maps are all first editions. The standard of reproduction is of an excellence that makes the provisional edition appear crude. Yet even now one still looks in vain for some consistency. The differentiation in tints of green between bush and scrub, which first appeared on the Auckland Sheet, has now gone with the introduction of a new legend on the Rotorua Sheet—the third in less than six years. But more remarkable are the changes in nomenclature: 'N.Z.M.S.1' instead of 'N.Z. M.S. Series 1'; 'one inch to one mile' instead of 'one mile to one inch', with '1 : 63360' placed first instead of '1/63360' after; type setting of names instead of hand lettering —these are some obvious variations. It is to be hoped that the publication of the Rotorua Sheet marks the end of experimentation in the Department of Lands and Survey and that all sheets on the same scale will in future bear an exact resemblance to each other. For this last sheet is a fine example of cartographic reproduction. If all others are of the same standard New Zealanders will be assured of an excellent series of topographic maps on the scale of one inch to one mile.

IN OUR CONTEMPORARIES

1. *In New Zealand Journals . . .*

A Regional Geography

GEOGRAPHIC REGIONS OF NEW ZEALAND: Various authors, *Post-Primary School Bulletin,* Vol. 4, No. 4, 1950, to Vol. 7, No. 1, 1953 (*partim*).

Between April 1950 and February 1953, the School Publications Branch of the New Zealand Education Department produced twelve issues of the *Post-Primary School Bulletin* covering the regional geography of this country. As the first complete regional survey of New Zealand to be published, they are a major contribution to our still slender literature of geography. Obviously they owe a tremendous amount to Dr. Kenneth B. Cumberland, whose *Atlas of Geography, Map Reading in Geography* and other publications have already been of inestimable direct help to geography teaching in New Zealand. The initial division into eleven regions is based largely on his extensive field work.

In the introductory bulletin, 'The Nature of Regional Geography', Dr. Cumberland explains the nature and purpose of regional geography, warns pupils against deterministic reasoning, gives good advice on the use and abuse of topographic maps, and shows how some of the regions were delimited. The five other authors in the series were chosen because of their intimate local knowledge of certain areas. In describing the regions, the authors do not follow a uniform order of features in a mechanical way (for example, geology, relief, climate, soils, etc.) but rather stress those aspects which give the region its distinctive character. This flexibility of approach works well. The material generally is excellent, although in some cases overcondensed. Canterbury-North Otago is restricted to sixteen pages while the less important Volcanic Plateau has thirty-two. Considering their significance in the regions, some urban centres hardly seem to receive enough attention. Causal relationships are treated with great caution, and some teachers would like to see more interpretation and evaluation.

The photographs have been selected with admirable judgement to show typical landscapes. Several show part of the area given on an accompanying topographic map, thus helping pupils to visualise landscapes from maps. After an inauspicious opening in the Northland-Coromandel booklet, the standard of photograph reproduction improved strikingly, the introduction of dull art paper no doubt helping to produce the splendidly sharp pictures in the later issues.

Most of the bulletins contain up to four simplified topographic maps of characteristic areas. These are very useful, but are not so satisfying cartographically as the first-class regional maps covering the location of the region, the generalised surface configuration, land utilisation, distribution of population, localities, communications and various other features of particular relevancy in certain regions, as, for example, power development in the South Island high country. Some minor discrepancies, and the omission of some places which receive half a dozen lines in the text, could be rectified in any future editions. The Fiordland-Stewart Island issue contains a valuable ten-page bibliography of reasonably accessible sources of information on the regions. Graphs are used sparingly, but to good purpose in several instances.

The bulletins are demy octavo in size, varying from sixteen to thirty-two pages, set in clear type, and have a pleasing format. The rather frail stapling will not long survive the handling these copies are bound to receive in secondary schools, so that reprinting will almost certainly be necessary before the texts have become outdated. It is suggested that a brief glossary of the more difficult terms and a guide to the pronunciation of Maori place names might be added to any second edition.

One most important question remains to be considered. With the exception of the introductory bulletin, the series is expressly written 'for all forms'. Teachers have found this claim too optimistic. Perhaps it is not over fanciful to suggest that in making a vivid description of a landscape, a geographer needs the eye of an artist and the ear of a poet. These essentially descriptive bulletins contain plenty of evidence of acute geographic perception, but the expression is much more open to criticism. Some teachers complain bitterly of the use of technical terms ('geographers' jargon'), but the reviewer considers that these are not only justifiable, but eminently desirable if used with discretion. The objection of other teachers is not so much to the excessive use of the specialised nomenclature of geography, but rather to the use of latinisms where simpler synonyms are readily available; to the complex sentence structure with awkwardly hanging relative clauses; to the partiality for compound adjectives, and the insertion of too many parentheses and qualifications. These are usually due to a laudable desire to achieve precision by the avoidance of broad inaccurate generalisations, but they undeniably tend to spoil any rhythm in a sentence. It has been found that junior forms understand most easily those bulletins dealing with Westland and Nelson-Marlborough, while seniors admire the even balance of the Volcanic Plateau issue.

But it would be a pity to end this review on a querulous note. Dr. Cumberland and his fellow authors, the School Publications Branch and the printers thoroughly deserve the heartiest congratulations and the sincere thanks of all post-primary geography pupils and teachers.—R. G. Wilson

Farming in North Canterbury

FARMING IN NEW ZEALAND; THE ASHLEY COUNTY: *New Zealand Journal of Agriculture*, Vol. 85, No. 5, November 1952, pp. 418-432.

The *New Zealand Journal of Agriculture* is far more than a magazine for farmers and gardeners. For the student of New Zealand geography it continues to provide detailed material on farming practices and problems in specific areas. Especially valuable is the series 'Farming in New Zealand' which continues to appear from time to time, although less regularly than in former years.

Ashley County, in North Canterbury, embraces considerable areas of extensive sheep grazing on steep eroded and weed-infested hill country, but there are also areas of intensive fat-lamb raising on land of gentle slopes and with good-quality pastures. Native forest still occupies an appreciable area (thirteen percent) and there is also the man-made Ashley State Forest. Large patches of undrained swamp persist, but there is also the flourishing orchard district of Loburn.

A brief sketch of the chequered history of large-scale grazing runs and of small wheat farms, and of the development of the present farming systems is followed by a consideration of the climatic and soil characteristics. In both these there is a sharp difference between downlands and hill country. The rather lengthy description of soil types is perhaps justified by the correlations made later with the different systems of farming.

Recognition and utilisation of the properties of different soils, the author says, have been important in improving pastures, for the knowledge of soil requirements has enabled the sowing of appropriate grasses and the application of the most suitable fertilisers. The aftermath of serious overcropping of unsuitable soils as late as the 1930's has been a great decline in the growing of cash crops, especially wheat. The acreage of pasture, and the area devoted to seed production, have greatly increased, and the availability of better grasses and clovers has been largely responsible for 'the growth of intensive fat-lamb farming, which is probably the most significant feature of farming development in recent time'.

The four main systems of farming described range from intensive fat-lamb production with cash cropping to extensive grazing of store sheep. The county thus exhibits a transitional character in Canterbury farming; it links hill and plain, mixed farm and high-country run. Dairying, the raising of beef cattle, orcharding and forestry are considered as minor elements of land use. As features which give a characteristic appearance to the landscape and which serve to mark off the Ashley County from adjacent areas, orcharding and forestry seem to have been too hurriedly dismissed.

—I. D. Leggat

Grassland Improvement

DEVELOPMENT OF BROWNTOP COUNTRY IN THE SOUTH ISLAND: A. Stuart, *N.Z. Journal of Agriculture,* Vol. 86, No. 2, February 1953, pp. 155-163.

OVERSOWING AND TOPDRESSING NORTH OTAGO HILL COUNTRY: W. R. Lobb, *ibid.,* pp. 141-145.

It is well known that the grasslands of New Zealand are of vital importance to the economic wellbeing of the country; pastureland covers almost seventy-five percent of the occupied area. However it is less fully realised that only twenty to twenty-five percent of these grasslands are intensively-used, high-yielding swards. It is evident that there is much scope for development and improvement of the extensive areas of poorer pasture, and it is with aspects of this most important problem that these two articles are concerned.

The first article deals with the main areas possessing a browntop (*Agrostis tenuis*) dominant cover in the South Island. These occur discontinuously in the foothills of the Southern Alps in Canterbury, and in the rolling downland and hill country of Southland and East Otago. Mr. Stuart describes methods employed successfully in the replacement of browntop pastures by the more productive perennial ryegrass-white clover dominant swards. Everywhere this involves ploughing, cropping, intensive liming, provision of adequate drainage, and the use of suitable mixtures of certified seeds. In detail, however, there are important differences in methods used in ploughing, in the type and number of initial crops grown before the new pasture is established, and in the amount of lime applied. It is pointed out that these variations are closely correlated with significant regional contrasts in soil type, rainfall totals and drainage. In order to maintain the new and improved sward, topdressing is essential and special care must be taken of grazing management.

The results obtained on several farm properties are outlined, and give convincing proof of the soundness of the methods adopted. They indicate one important way of increasing production through the intensification of the use of land already farmed.

Other means of achieving a more efficient use of farmland are discussed in the second article. Mr. Lobb describes the methods of oversowing and aerial topdressing which have resulted in a substantial improvement in the carrying capacity of tussock grassland and poorer exotic pastures in parts of the hill country of North Otago. It is emphasised that several factors must be given careful consideration if the methods used in development are to be effective. The areas must have sufficient rainfall to benefit from topdressing and to ensure the satisfactory establishment of grasses and clovers. The phosphate requirement of the soils must also be studied, as the successful introduction and growth of clovers is closely dependent on the presence of an adequate supply of this mineral. Conversely, topdressing and the oversowing of grass seed will result in little improvement unless clovers are also established in sufficient quantity. Furthermore, where the soil is deficient in the trace element, molybdenum, this must be added. Otherwise, responses will be poor. Several other factors are mentioned as influencing significantly the suitability of areas to be topdressed and oversown. Development is virtually impossible at present where rabbits are numerous and where the tussock cover is sparse.

Both articles describe methods which have had most encouraging results in the areas where they have been tested. An important increase in primary production would be achieved if these methods were carried out in the extensive areas suitable for such development.—R. G. DICK

2. *In Overseas Journals . . .*

FIJI'S POPULATION DILEMMA

LAND AND POPULATION PROBLEMS IN FIJI: Eila M. J. Campbell, *Geographical Journal*, Vol. 118, Part 4, December 1952, pp. 477-482.

In 1950 Miss Campbell paid a flying visit to Fiji after spending almost a year doing research into some aspects of the geography of New Zealand. As yet, and as far as is known, the results of Miss Campbell's work in New Zealand have not been published. But before a meeting of the British Association in 1951 she read a paper on the now well-trodden ground of Fiji's rapidly-growing population. The paper has been subsequently published in the *Geographical Journal*. It is as brief as Miss Campbell's visit. It is based on the examination of official statistics, government departmental reports and council papers rather than on fieldwork. It is concise and to the point and forms a useful summary, although it adds nothing new. It overlooks other recent non-governmental statements on the problems it reviews, especially Stanner's valuable assessment in *Pacific Affairs*. Its two main conclusions are: 'to reconcile the interests of Fijian, European and Indian is no mean task'; and '. . . the Indians in Fiji can maintain and improve their present standard of living only by a voluntary reduction of their high birth rate'.

There is a generalised map showing for each province the proportion of its population which is Fijian or Indian, but the key to the map makes little sense, the result probably of a draughtsman's error. New Zealand teachers will find most valuable the full-page reproduction of a low oblique air photograph of the island *koro* of Serua as an alternative to the more frequently photographed village of Mbau.

Samoan Agriculture and Selfgovernment

PACIFIC ISLAND AGRICULTURE: THE CONTEMPORARY POSITION IN WESTERN SAMOA AND SOME WIDER IMPLICATIONS: W. B. Johnston, *Economic Geography*, Vol. 29, No. 1, January 1953, pp. 26-38.

In view of the New Zealand Prime Minister's recent announcement that early steps will be taken to institute selfgovernment in the Trust Territory of Western Samoa, Mr. Johnston's review of the territory's agricultural problems and their 'wider implications' is very timely. He emphasises again that soil is the basis of Samoan welfare, that economic prosperity and political advancement cannot be divorced, and that political independence must rest upon future policy towards the land.

At present shifting agriculture, spurred by rapidly-growing population, is extending into steep hill country with heavy rain; land is being rotated more quickly and thus used more frequently; fixed commercial cropping is replacing shifting subsistence cropping; as a result soil erosion is a rapidly-extending menace. As pressure on Samoa's agricultural and forest resources increases, doubts about their permanence are expressed. Mr. Johnston's examination of the situation is clear, if not complete; and his numerous conclusions seem to be solidly-based. But he has no suggestions for the future. He raises a finger of warning; but is silent when it comes to constructive programmes and policies.

Selfgovernment soon appears inevitable. The most urgent thing is to find land policies to accompany it and to make it successful. New Zealand has a responsibility here. Trusteeship involves more than the abandonment of a dependent territory to its own problems. Fortunately there are indications that this is properly appreciated and an 'economic survey' of Western Samoa is to be undertaken. The only questions are whether an 'economic' survey is enough and whether it will embrace also a detailed survey of land-use and agricultural geography.

REVIEWS

NEW ZEALAND'S MOUNTAIN LANDSCAPES

LAND UPLIFTED HIGH. By John Pascoe. Christchurch: Whitcombe and Tombs Ltd., 1952, pp. 235.

Mr. Pascoe's first work, *Unclimbed New Zealand,* was published in 1939. Now thirteen years later, he has again written at length of the mountains. Meanwhile, through the pages of the *New Zealand Geographer* as much as anywhere, the reading public has come to recognise that his particularly personal written and photographic reporting of the New Zealand scene is generally of high originality, quality and power.

As the table of contents shows, Mr. Pascoe has left the restricted area of the Canterbury-Westland ranges wherein he and his companions did much excellent exploratory mountaineering during the 'thirties. He describes excursions and expeditions from the Waitakeres in Auckland to the Rangitata headwaters in Canterbury. From the viewpoint of completeness it is a pity his journeyings did not take him to the ranges south of the Hermitage. Were these Otago and Southland mountains included, the author could lay claim to have covered the entire varied 'high country' of the South Island as well as representative portions of the North Island.

Many of the trips described are direct or consequential results of his work with the Department of Internal Affairs in Wellington. Some expeditions are described for their own sake, while others are of more slender mountaineering interest; both supply the narrative background enabling the author to form his knowledge of local history, topography and society into a coherent whole. At times this technique succeeds admirably; the chapters on the Tararua Ranges are brilliant description and analysis indeed. In other cases success is less startling. Nowhere is there weakness amounting to failure, for his pen has gained polish with the years. Unlike many climbers with an urge to write, Mr. Pascoe reveals not only much about himself but happily much about the country in which he is travelling. This is what makes *Land Uplifted High* of value to the regionally-conscious geographer, for few skilled observers have examined the variety of landscapes occurring within that major part of New Zealand which falls into the all-embracing category of 'mountainous'. Here, incidentally, is such a beginning.

There are four chapters on special topics, the first of which is a restrained tribute to three climbing companions who died during the war. The second is a reprint of Mr. Pascoe's outstanding article on high country sheepmen in the first issue of this journal (*N.Z. Geographer,* Vol. 1, No. 1, April 1945, pp. 19-39)—and to the geographer it is still the most useful part of *Land Uplifted High.* A straightforward account of deer-killing operations under the direction of Major Yerex fills a long-standing gap, acknowledging as it does the part played by the culler in the mountains. 'The Writers' forms the basis of a lively critique of mountain literature. Here the author is in his element, and his comments are fair and balanced. A note on Wellington climbing clubs adds more spice and criticism, and Mr. Pascoe drives home his arguments about mountaineering technique. With these few climbers would disagree. Mr. Conway's useful appendix on food and equipment will bring forth comment from old hands and be of value to newcomers to the mountain scene.

Two minor errors caught the reviewer's eye—a footnote promises on page 228 a sketch for which one searches in vain. On page 107 it is stated that the east ridge of Greenlaw has not again been traversed. It has—by the reviewer and two other Canterbury University College students during Easter 1946.

Mention must be made of the photographs and maps. The four maps vary considerably in legibility; that of New Zealand is of little use. If intended for overseas readers it is inadequate for those areas lying outside the three detailed maps, and even New Zealanders will feel the need of large-scale maps—a need the author might well have supplied through additional sketch maps. Most of the twenty-two plates are superb, but why the scratched, flat photograph of Pinnacle Ridge of Ruapehu?

Land Uplifted High is a book every New Zealand mountaineer will buy and any geographer at all interested in his country will read with interest and profit.

—W. P. Packard

Back Country Tschiffley

HIGH COUNTRY JOURNEY. By Peter Newton. Wellington: A. H. and A. W. Reed, 1952, pp. 206.

Peter Newton has made a name for himself as one of the few who can live a 'bush' life and be articulate about it. The High Country is his whole existence and his eagerness to take more sedate people into his paradise has been obvious in all his books. Unfortunately, as other writers have proved, there are limits to the ways in which you can write about any one type of life. Mr. Newton has made three approaches to his subject, each from a different direction: first, *Wayleggo*—plain autobiography; second, *High Country Days*—the fictional approach; third, *High Country Journey*.

This last is the story of his ride from south to north throughout the whole of the back country of Canterbury. How many of us envied him his trip! To see with our own eyes all those stations which are household words to us; to talk sheep, dogs and horses with men who think as we do; to look at 'country' with a sheepman's eyes, passing leisurely through it, so that every little detail sinks in and stays! That was something worth doing!

Mr. Newton would be the first to admit that he and his mate travelled too quickly; they had to, unless they were prepared to take a year over it. The book consists of a description of each run through which they passed—and they conscientiously digressed to see as many stations as was humanly possible. Usually there is a survey of the stock carried and methods of working, and a tribute to some outstanding personality connected with the place. All this is of interest to the professional High Country man. How far it will interest the general reader is another matter. After a while the catalogue of sheep numbers, blocks, ranges and valleys becomes confusing and the reading becomes mechanical. Where the writer is at his best is in his descriptions of the stations he knows well. His anecdotes are then, naturally, more varied and his intimate knowledge of the country encourages him to write more about each station. Throughout his ride, his intense delight in the scenery and the impression of exploration is obvious to the reader—the story is infectious in its excitement despite some lack of originality in the phrasing.

Many will be interested in the book, which has been beautifully printed and well illustrated, but it is inclined to fall between two stools—the technical and the purely entertaining.—DAVID MCLEOD

A DEER-STALKER'S LIFE

DEER HUNTER. By Joff A. Thomson. Wellington: A. H. and A. W. Reed, 1952, pp. 194.

Anyone who feels inclined to say that young people nowadays are soft and spoilt by ice cream and easy living should read this book and think again. It is enough to say that Joff Thomson is only one among a number who are carrying out this arduous war against the herds of deer which were so unwisely introduced into New Zealand.

Joff Thomson comes of a tough family—they are all, presumably, back country 'types' and several of them have followed the same calling. He describes in plain, if unimpressive, language the story of his career as a deer hunter, both as an employee of the Department of Internal Affairs and on his own. He tries to show his attitude to his work—to explain the attraction of this life of destruction. Like every other job in life, men come to do it without too much introspection. The deer are there and they must be killed; something primitive exists in most men, some survival of the long-distant past when life depended upon hunting. What comes out so clearly in this book is the type of man who is only in his element amongst the wilds. Everyone should read his description of an army camp as he saw it and of his flight to the hills to escape for a while the searing horror of incarceration.

He shot, literally, from Nelson to the Bluff and his story covers a lot of ground which will be unfamiliar to most readers. One is struck, of course, by the immense loads of skins a man is prepared to carry out, particularly when he gets into the wapiti country. This part of the book will surprise many people. It is often assumed that wapiti are to be found in open valleys and bush-fringed flats. Not a bit of it! Thomson had to chase them out into high basins just beneath the snowline where one would be more inclined to look for chamois. Imagine carrying a skin which weighed 26 lbs. *when dry* out of that sort of place!

This book is a contribution to our knowledge of how New Zealanders live and will be widely read. Its chief drawback is a lack of humour in the telling, but it is honest and quick moving.—DAVID MCLEOD

COOK STRAIT

STRAIT OF ADVENTURE. By Stephen Gerard. Wellington: A. H. and A. W. Reed, Second edition, 1952, pp. 151.

Among the 'ifs' of New Zealand history one may include the question: 'What would have happened if Cook Strait had never been formed?' Our development would have been considerably simplified. Land transport would run unbrokenly from Auckland to Invercargill. There would have been fewer shipwrecks. Te Rauparaha might never have become one of the two Maori Napoleons. Most important of all, rivalry between the two main islands would have been much less acute, to the benefit of our national growth. On the other hand we should have missed a good deal; for one thing, the Marlborough Sounds, that splendid playground which is insufficiently appreciated by reason of the very lavishness with which Nature has showered such blessings upon us. And the strait itself is the most exciting feature in the geography of New Zealand.

It can be bold, fascinating, beautiful, baffling, unpredictable, and terrible. Its sinuous shape and steep bordering lands, high winds, and strong capricious currents form the hardest whetstone for navigation and seamanship. The territories fringing it are steeped in historical association of many kinds, from war and cannibalism and shipwreck to the fine flowering of European civilisation. Well might the late Stephen Gerard say in the opening paragraph of this book that 'in all the great South Sea is no other waterway so storied and romantic'.

By Cook Strait New Zealanders mean much more than the narrow seaway between Terawhiti and Tory Channel. For the seaman the strait begins at Cape Campbell and Cape Palliser in the east, and Stephen Island (perhaps Farewell Spit) in the west. Kapiti, the Entry Island of Cook, is part of it. So are Wellington City, Picton and even Nelson. Similarly the Strait of Dover cannot be divorced from the waters into which it widens at both ends. Stephen Gerard took this view of Cook Strait. He wrote of Te Rauparaha on Kapiti, of the colonisation of Port Nicholson, of the Wairau 'massacre', of Greville Harbour on the western side of D'Urville Island, and of gold at Wakamarina. Cook Strait cannot be dissociated from the hills and valleys and harbours about it.

Stephen Gerard, a born romantic and adventurer, an Elizabethan in his passion for roaming and the colourfulness of his disposition, sampled Cook Strait by sea and land. He sailed a ship's boat single-handed through a night of storm between Lyttelton and Wellington; crossed to Blenheim in the scow *Echo;* hunted whales in a high-speed launch; and tramped the Marlborough hills. Had he lived (he was killed in the Java Sea battle) I feel sure he would have revised this book. Its forceful and highly coloured style is heavy with the lushness of undisciplined enthusiasm. There are too many adjectives, too much pressing of the grape. The publishers decided that in the reprint everything should stand except for one alteration in fact and some new illustrations.

The chief value of the book lies in his personal explorations by sea and land, the corners lit up by his restless, enquiring, imaginative mind, such as the Maori village near Picton where the children knew no Maori; what Ship's Cove and Motuara really look like today; the indifference of some Europeans to the relics of history; the sheep station at Port Underwood that dates back to Clifford's importations for Flaxbourne. In such places and moods, he throws new light on past and present. A better book will be written about Cook Strait some day, but this will always have value for the ardent spirit that shines through it.

The pictures are excellent, but one or two of the aerial photographs illustrate in striking fashion the kind of distortion that this method may produce. Stephen Island stands out like a piece of fine sculpture, but flattened Picton loses a lot of its peculiar beauty.—ALAN MULGAN

Exploration and Privation on the West Coast

THE GREAT JOURNEY: THE JOURNAL OF AN EXPEDITION TO EXPLORE THE INTERIOR OF THE MIDDLE ISLAND, NEW ZEALAND, 1846-1848. By Thomas Brunner. Christchurch: The Pegasus Press, 1952, pp. 111.

The second journey of Thomas Brunner to the West Coast of the South Island in 1846-1848 was surely the most remarkable feat of overland exploration in New Zealand. Although the broad outline of Brunner's journey is fairly widely known, the magnitude of his achievement in enduring 550 days in a wilderness of rock, bush and rain, and yet returning alive, can be appreciated only by reading the day to day account written by the explorer himself. Previous versions of Brunner's diary appeared in the newspaper *Nelson Examiner* in September-October 1848 and in the *Journal of the Royal Geographical Society,* 1850, but these sources are not readily available. The present book, published with the assistance of the State Literary Fund, is therefore overdue and is to be welcomed in making accessible one of the classics of New Zealand exploration. The text of the book follows the edition printed by Elliott in 1848 at the *Nelson Examiner* office, while the map, enlarged from the Royal Geographical Society publication, forms the endpapers. A brief introduction by John Pascoe places the journey in its historical setting and includes some biographical notes on the explorer. Footnote references interpret for the modern reader Brunner's more obscure spelling of place names.

The journal is much more than a record of day to day progress by Brunner and his four Maori companions. It includes terse and often vivid word pictures of the country traversed, descriptions of Maori life on the west coast and methods of preparing food, and gives the author's feeling on the monotony of forest, storm and granite during the laborious months spent in traversing the Buller Gorge: 'Rain continuing, dietary shorter, strength decreasing, spirits failing, prospects fearful.' Yet despite the floods and rain, hunger and illness, Brunner could sometimes see beauty in the West Coast landscape.

Brunner provides the first description of the mode of living and distribution of settlement of the handful of Maoris living on the West Coast. Along the entire coast from the Buller River to the Paringa, the southern limit of his journey, the explorer counted but ninety-seven adult natives, although there was evidence of a larger population at an earlier time. There is a curious reference to old taro plantations found on the bank of the Hokitika River. The generally-accepted limit for taro cultivation in Maori times is Cook Strait. However, Brunner's qualifications as an economic botanist may be questioned in view of his report of kauri trees growing near the present town of Reefton.

Brunner's summing up of the results of his expedition is modest in the extreme. He had set off purely on an amateur trip to satisfy a personal curiosity about the character of the middle and west of the island. He had discovered no vast grazing lands for the flocks of the Nelson sheep farmers, and he was certain there was no accessible pass across the mountains of the South Island to the north of the Grey valley. Even the discovery of a seam of coal 'of apparently very fine quality' on the banks of the Grey River does not seem to have excited his imagination as to its economic possibilities. Indeed his final assessment could hardly have shown less enthusiasm for the resources of the land he explored: 'I am, however, sure that there is nothing on the West Coast worth incurring the expense of exploring, but I certainly think the natives there require something to be done for them.' He suggests giving them a few good axes, some nails and that 'the introduction of goats would much benefit them'. There is no doubt that Brunner's report contributed to the impression that the West Coast was but a rain-sodden wilderness unfit for settlement, and served to deflect the curiosity of explorers from this region for another twelve years.—MURRAY MCCASKILL

LOST ENDEAVOUR

PIONEERS OF MARTINS BAY. By Alice McKenzie. Christchurch: Whitcombe and Tombs Ltd., 1952, pp. 129.

In 1870, a few years after the routes to the west coast of Otago from Wakatipu and Te Anau had been explored, a settlement was founded at Martins Bay, and the provincial surveyors laid out the township of Jamestown on the shores of Lake McKerrow. The great trough of the Hollyford River and the fairly easy passes into it seemed to open up a fine connection to the west coast and so lead to easy communication between Australia and the growing colony of Otago. The high hopes of the 'seventies, however, rapidly dwindled away. The natural hazards of a rainy, mountainous country and the difficulties of life in the bush forced many settlers to leave, but for the most part the isolation of the lonely little settlement was its undoing. The awkward Hollyford bar made unloading and loading of ships dangerous, while the development of overland communication of even the simplest kind was hampered both by the thick bush and by the vested interests of the east. Gradually the gaps in the regular steamer services—at first two-monthly—became wider, the population diminished, the huts fell into decay, and the bush crept back over the streets and sections of Jamestown.

At last only one family remained at Martins Bay. These were the McKenzies, and this book is written by one of them. Mrs. Alice McKenzie's father brought his family to the settlement from Jacksons Bay only six years after its foundation, and though Mrs. McKenzie married and left for Glenorchy in 1902, her two brothers continued to live and farm at Martins Bay until just before the second World War, visiting their sister each year after taking their cattle through to Mossburn.

It is often a grave fault with books of memoirs such as this that they paint a vivid picture of the personalities involved, and even the social customs of the day, but give the reader no idea of the setting of the community or its way of life. Mrs. McKenzie, however, has succeeded in conveying an extraordinarily vivid impression of both the natural stage and the actors—the landing of stores, the droving of cattle and the building of boats and houses, for instance. Not that the personal touch is missing—the sorrows, hardships and deprivations of the family and their neighbours, and the flashes of fun and humour which light up daily life are all recorded. Equal sympathy is displayed in dealing with the loss of small children and the siege by an angry bull.

It would be easy to criticise the book as a work of literature. The writing is often jerky and uneven. Its chief fault, perhaps, lies in the way events and people are jumbled together, so that one is left with a rather hazy idea of the order of events and the relation of the various persons, in spite of the introduction and appendices. But one may be given leave to doubt whether subediting might not have destroyed something of the book's charm; as it is, it reads true to character, the telling of an old lady's memories, as it might be to her grandchildren round the fireside.

In a country which is still developing, it is always curious to chance on these areas which have once known abundant life and are now desolate—and this was not just an ephemeral mining camp. Doubtless one day a road will run right down the Hollyford and up to the Haast, and the years from 1880 will seem a mere interlude in the history of the area. The dreams of the early pioneers sometimes take a long time to come true.—Eileen L. Elliott

Abbess Peak to Zora Glacier

THE NEW ZEALAND GUIDE. Compiled by E. S. Dollimore. Dunedin: H. Wise and Co. Ltd., 1952, pp. 926.

Appreciation of geography has widened and deepened since the days when a cane-swinging pedagogue instilled fear in scholars who failed to recite the names of headlands and rivers from North Cape to the Bluff. Yet, horrible as this method of teaching may now appear, it had its virtues. Children could at least find their way about a map, names had some significance, and any factual knowledge—no matter how laboriously gleaned—possessed associations with 'place'. Nowadays, alas, too many pupils glibly generalise about life and people and fail to demonstrate where exactly those same folk live. If the essence of geography be the recognition and understanding of differences from place to place, it becomes axiomatic that the precise location of places as such should be known. The touchstone of any student's understanding of geography is his ability to record his knowledge on a map—preferably a sketch map, for that type of map demands the recognition of essential geographic characteristics.

Small wonder, then, that this lack in 'place geography' has today become the *cri de cœur* of any and every examiner. It is a deficiency for which the schools alone are to blame, and with them lies the remedy. A gazetteer is one aid, and as far as New Zealand is concerned *The New Zealand Guide* is indispensable. This book, an expanded version of *Wise's New Zealand Index,* merits a place on every reference bookshelf. Interest in one's own country should ensure that. Entries vary in length from the single line for localities, sheep stations and less important physical features to the three pages for Wellington. A wealth of material has been drawn upon to supplement information on places of historic interest—in particular, the debt to James Cowan is acknowledged. From a geographic point of view, thirty-three full-page illustrations in half-tone add to the attractiveness and, to a certain extent, the usefulness of the book, for they are an aid to the appreciation of what a few places are like.

Twenty-eight pages of general information and ten of advice to tourists and travellers constitute the final section of this gazetteer and guide. As a source of factual information it has no peer in this country, and though one might quibble with the use of New Zealand colloquialisms like 'hydro' to denote hydroelectric power stations, and shy at the temerity demonstrated in the translation of some Maori place-names, no exception can be taken to the efforts of compiler and publisher to produce a compendium that is indispensable to the layman, the business executive and the student.

ANTARCTICA AND ITS BORDERING SEAS

THE ANTARCTIC TODAY: A MID-CENTURY SURVEY. Edited by F. A. Simpson. Wellington: New Zealand Antarctic Society and A. H. and A. W. Reed, 1952, pp. 389.

This volume is a valuable symposium by various experts, most of whom have had experience in the Antarctic. Among the authors are J. S. Cumpston, N. E. Odell and P. G. Law who are well known for their studies in exploration. The first-named writes the introduction, and this is followed by three chapters on glaciology, geology and oceanography. Four chapters deal with the biology of the continent and adjacent seas; three are concerned with meteorology; and five with the political and commercial aspects of the seventh continent.

The reviewer knows of no book which gives such a well-rounded account of the various aspects of Antarctic investigations. There is a large folding map which brings right up to date recent explorations. Among these are Ronne's surveys at the base of the Weddell Sea, which have completed the coasts of this huge area of some five and a half million square miles.

The chapter on glaciology gives an interesting discussion of the probable thickness of the ice cap, and records that a recent measurement has shown that it is 7,400 feet in Queen Maud Land. One would surmise that this vast weight of ice would give a basin shape to the oval portion of the continent known as East Antarctica. Odell makes frequent use of the fine monograph by Wright and Priestly, but does not discuss in any detail the problem of the carving of the land surface by the various iceforms. This was the chief interest of the reviewer in 1910-1913, and Antarctica obviously offers a unique field for research into the topography of *a land in the Ice Age*. He summarises the various theories as to the origin of the Ross Ice Shelf, and makes interesting comparisons between Antarctic glaciers and those he has himself studied in the Arctic and in the Himalayas.

The chapter on geology by Fairbridge is particularly interesting. The structure of the continent is described, and the writer seems to adhere to the belief that it consists of a shield, East Antarctica, separated by a wide depression from the fold mountains of West Antarctica. He calls this depression a Graben(?), but the reviewer would point to the other continents round the Pacific, where the similar structure is more of a geosyncline. A page illustration shows the colossal submarine terminal moraines named after Mawson, Davis and Pennell. Fairbridge remarks that few of the minerals found there are of value, excluding the wide deposits of inferior coal. (Current ideas as to Antarctica being a useful field for uranium exploration seem absurd to the reviewer. Why not explore the Shields of Australia or Canada, where one can at least *see* wide exposures of rock for investigation?) He has used my block diagram of the Ferrar-Taylor region to illustrate the general character of the stratigraphy in the East Antarctic Horst. Other sections deal with West Antarctica and with the subantarctic islands. A final discussion links Antarctica with the Wegener 'Continental-Drift Hypothesis', but Fairbridge does not commit himself to a definite opinion.

The chapter on oceanography gives a very pleasing block diagram to illustrate the stratification of the warm and cold layers of water in the Antarctic Ocean. There is a full discussion of the deeps and shelves, and of oceanic deposits. The next chapter deals with marine biology, and Dell points out that the uninterrupted character of the Antarctic Ocean has made it an unrivalled field for studying the broader features of animal and plant distribution. The chapter on whaling is the best account seen by the reviewer to date. Good drawings of the various genera are given, and the statistics of the catch of whales are brought right up to 1951. About 26,000 baleen whales and 5000 sperm whales are taken each season. Further chapters on seals and birds are illustrated by very fine photographs.

A useful commentary on current ideas as to Antarctic meteorology follows, but the author is chary of adhering to any simple explanation of the 'fronts' in a region where stations are so few and records so short. An aurora map shows these phenomena are most frequent in an annulus about the magnetic pole, but the coastline near Enderby Land at fifty degrees east seems the best area to observe the phenomena. The section on ionosphere research will probably appeal mainly to the specialist. The reviewer can commend the last chapters which give a fairly full account of the work being carried out in subantarctic islands. The part played by younger nations—such as Australia, New Zealand and South Africa—is described in detail in the last pages of this very valuable volume. No student of Antarctic affairs can afford to omit a careful study of the up-to-date scientific information in the book; and the reviewer ventures to congratulate the New Zealand Antarctic Society on its unusual and invaluable contribution to Antarctic literature.—GRIFFITH TAYLOR

HISTORICAL GEOGRAPHY

THE DOMESDAY GEOGRAPHY OF EASTERN ENGLAND. By H. C. Darby. Cambridge: The University Press, 1952, pp. 400.

The *New Zealand Geographer* rarely publishes reviews of books which have no immediate concern for, or reference to, New Zealand, Australia and the Pacific. It is, however, justified in making an exception of the first of a series of substantive volumes reconstructing the Domesday geography of England. Twenty years of work by many persons have gone into this project and Professor Darby's *Eastern England,* covering Lincolnshire, Norfolk, Suffolk, Essex, Cambridgeshire and Huntingdonshire, is the first full-scale outcome of this monumental and scholarly exercise. After a review of the literature on the Domesday Book and a survey of the problems involved in its interpretation there follows a reconstruction of the geography of each county towards the end of the eleventh century. Each chapter maps, describes and interprets the distribution of settlements, the number, occupations and prosperity of their inhabitants, the patterns of land utilisation (discussing separately woodland, meadow, pasture, marsh, salt pans and wasteland), the kinds and numbers of livestock, the number and distribution of grain mills, the location of fisheries and the nature of contemporary urban and social life—all by mapping and interpreting the Domesday records of the inquest of 1086. Each chapter is summarised by a concise synthesis and careful assessment of the character of the regions within each county. When complete this series of erudite, painstaking surveys will constitute the most complete and substantial study in historical geography that exists. And Professor Darby's initial survey promises well for the series as a whole.

Geographers have in recent years spent much time and effort discussing the scope and content of their subject. The nature of historical geography and its relations to the subject as a whole have had their share of this wordy argument. But substantive works like Ralph Brown's *Mirror for Americans* and now Darby's *Domesday Geography* are worth very much more than volumes of abstract discussion and hours of tedious argument at meetings. There could be no more complete or effective reply to critics who find 'risks' attached to historical geography conceived logically as 'simply the geography of past periods'. These works are by no means 'merely empirical description'. Nor are they 'no more than economic history plus maps'. They are amongst the most rewarding and scholarly geographical statements we have in the English language. If some persist in saying that they are not geography, what does it matter? No scholar or scientist can claim to have said the last word on any such problem. What is needed is less discussion and more substantive works like the Domesday geographies. The successors to Professor Darby's initial volume will be eagerly looked for.

Geography Teachers' Manual

THE TEACHING OF GEOGRAPHY IN SECONDARY SCHOOLS. By the Incorporated Association of Assistant Masters in Secondary Schools. London: George Philip and Son Ltd., Third edition, 1952, pp. 512.

Since the first edition of this book appeared in 1935 under the title of *Memorandum on the Teaching of Geography* much has happened in the world, and the history of the last seventeen years has considerably affected education generally and the teaching of geography in particular. The third edition of this book will therefore be warmly welcomed by teachers of geography. We have here in New Zealand been introduced to ideas on the teaching of geography from both England and the United States of America, and we are slowly absorbing these ideas and moulding them to our own circumstances. From one source we have received the philosophy behind the social studies theme, with its renewed emphasis on education for citizenship; from the other source we have been introduced to the science of geography as a separate discipline, with its emphasis on regionalism. These two philosophies are discussed briefly in the preface to this edition, a preface which, therefore, should be read even by those who 'never read introductions'. The emphasis in this book is on regionalism, with the first chapter dealing with the evolution of this approach to the subject.

The chapter on the scheme of work outlines the course that is normally followed, from the local study, outwards through the home country to the world, continent by continent. One of the most interesting additions to the earlier editions is the discussion on the value of the teaching of sample studies rather than whole continents; detailed studies of small areas rather than generalised methodical studies of continents or countries region by region. The conclusion is reached that 'detailed study of small regions typical of larger areas, or even detailed study of a farm or an industry, are of more value than general surveys'. The present move in New Zealand to narrow the scope of the various examination prescriptions is, of course, in line with this philosophy.

Other ideas expressed in this book and worthy of note are: 'Specialisation in "departments" of geography is fortunately declining'. 'Only those aspects of physical geography which directly affect human activity need be included in the general course.' 'The early evolution of mankind was largely controlled by geographical conditions, but as time went on and conditions throughout the world became more uniform, geographical factors became less and less important and man's progress became more and more subject to the dominating force of the human will.' (Here 'geographical' has the now largely discarded narrow and limited meaning of 'physical'. Most would, of course, claim that the features produced by the operation of 'human will' are also geographical.) 'If these courses [in social studies] fall into the hands of those who lack geographical training or who are unsympathetic to [geography], not only may the position of geography be seriously affected, but much of the value of the social studies themselves may be lost.'

Other interesting paragraphs included those on the place of historical, economic and political geography. The bulk of this book is of course concerned with methods of teaching and equipment, but it includes chapters on sixth-form geography, on excursions 'outside the timetable', and, new to this edition, a chapter dealing with geography in secondary modern schools in England. This is of particular interest in New Zealand now, with the increasing number of coeducational, multi-course secondary schools that are being established, as they are our nearest approach to the English Secondary Modern School, and are faced with many of the same problems. Suggested schemes for such schools are included. Appendices include one on examinations, another on the training of teachers, and a large bibliography.

With the rapidly-growing secondary school population in New Zealand, there will continue to be many teachers of geography who have not hitherto specialised in that subject; there is also fortunately a rapidly-growing number of geography graduates entering the secondary schools. To the first group, this book should prove invaluable, both for the philosophy and the practical suggestions; to the second group, it offers the advice of experienced teachers of the subject to add to the academic knowledge and philosophy that they have obtained at university and teachers' colleges.

—J. L. Hewland

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